

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Chapter 4 analyzes the potential environmental impacts or effects of the proposed management actions explained in the four alternatives described in Chapter 2-Alternatives. The four alternatives describe different ways to manage the Federal land and resources within the Monument to achieve the goals and objectives and to meet the purpose and need for overall management of the Monument. The baseline used for the analysis is the current environment is described in Chapter 3-Affected Environment. Impacts are defined as changes that may occur to the existing environment as a result of the actions described in the alternatives. The impacts can be beneficial or adverse and can be projected for short-term or long-term. Short-term impacts are defined as impacts that may range from 0-5 years and long-term impacts may be permanent and may remain for the life of this planning document and beyond. Direct and indirect effects will be discussed together in the following sections followed by a cumulative effects section.

Table 4-1 Definition of Impact Terms

TABLE 4-1 DEFINITION OF IMPACT TERMS	
Direct	effects "...which are caused by the action and occur at the same time and place" (40CFR 1508.8(a)).
Indirect	effects "...which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth, and related effects on water and air and other natural systems, including ecosystems" (40 CFR 1508.8 (b)).
Cumulative	"...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions" (40CFR 1508.7).
Reasonable Foreseeable Development	Consist of actions that can be projected, with a reasonable degree of confidence, within a range of time that will impact a resource.

The BLM's decisions about resource use and allocation within the Monument will be formed by the impact analysis in this Chapter. A comparison of these impacts is shown at the end of Chapter 2.

4.2 ANALYTICAL METHODOLOGY

The BLM interdisciplinary team members used their professional judgment, existing and current data, and current models and methodology for the analysis.

4.2.1 Analytical Assumptions

Several general assumptions were made to help guide the analysis by the resource specialists and also to inform the public. The assumptions listed below are Common to All Alternatives. Specific assumptions to individual resources or uses are detailed in the discussion of that resource.

- Management actions proposed in the alternatives apply to public land within the Monument. However, cumulative effects analyses consider potential actions by individuals, entities other than the BLM, the BLM, and actions in Doña Ana County or as further defined.

- Generally speaking, proposed actions that would increase visitor use, public access, and information regarding the Monument’s paleontological resources would result in an increase in the opportunity to locate, loot, and vandalize these resources. On the other hand, actions that would increase BLM presence at the Monument and inform and educate the public about the value of the Monument’s unique resources would serve to deter looting and vandalism.
- The alternatives would be implemented in accordance with all laws, regulations, and best management practices (BMPs). BMPs are located in Appendix E.
- Funding and staff will be available to implement any of the alternatives proposed in this Plan.
- Acreages were calculated using GIS technology; there may be slight variations in total acres between disciplines. These variations are negligible and will not affect analysis.
- All PTNM legislative directives are analyzed such as:
 - Continue to manage that portion of the Robledo Mountains Wilderness Study Area (WSA) within the Monument pursuant to FLPMA Section 603(c) and the BLM *Management of Wilderness Study Areas Manual 6330* until such time that Congress designates it as a Wilderness Area or releases it from further consideration.
 - Continue to manage that portion of the Robledo Mountains Area of Critical Environmental Concern (ACEC) within the Monument as an ACEC.
 - Subject to valid existing rights, any Federal land within the Monument and any land or interest in land that is acquired by the United States for inclusion in the Monument are withdrawn from, entry, appropriation, or disposal under the public land laws, location, entry and patent under the mining laws and operation of the mineral leasing laws, geothermal leasing laws and minerals materials laws.
- The RMP decisions would remain in effect throughout the life of the Plan. A plan amendment “shall be initiated by the need to consider monitoring and evaluation findings, new data, new or revised policy, a change in circumstances or a proposed action that may result in a change in the scope of resources uses or a change in the terms, conditions, and decisions of the approved plan” (43 CFR 1610.5).
- Current visitation to the Monument is estimated to be 10,000 to 15,000 people. Methodology for this is described in Recreation and Visitor Services in section 4.4.3 below.

4.2.2 Incomplete Information

Where possible, site-specific data are used, but not all resources or uses have complete data to the extent needed for this plan. The best available data is used in developing this RMP. For resources with incomplete information, the impacts are estimated to the best of our knowledge. The data available was considered adequate to make reasoned choices among alternatives.

4.2.3 Resources or Programs Where No or Negligible Impacts Would Occur

Resources and uses that are either not present or not likely to be impacted within the *Analysis Area*: American Indian Uses and Traditional Cultural Practices, Riparian Areas, Woodlands, Floodplains and Wetlands, Geology, Minerals, Hazardous Wastes, Prime or Unique Farmlands, Wild and Scenic Rivers.

Actions that are often associated with ongoing management are not addressed in this Chapter and include but are not limited to: Identification of fossil locations, research management actions, and maintaining and updating baseline data. These actions would be analyzed under the appropriate level of NEPA.

4.3 CHAPTER ORGANIZATION

Effects from different management alternatives that could be implemented under this RMP are considered on all resources/uses that are affected by that management action. Where applicable, the analysis addresses the Planning Issues that were brought forward from internal discussions and public scoping. These issues are: Paleontological Research, Recreation, Trails and Travel Management, Wildlife, Vegetation, Livestock Grazing, and Education and Interpretation.

The following impact discussions are organized alphabetically after the first four resources/uses, which are Paleontological Resources, Education and Interpretation, Recreation and Visitor Services, and Trails and Travel Management. Impact discussions are arranged as follows:

RESOURCE OR RESOURCE USE

Assumptions and Incomplete Information: In this section criteria used to consider the impacts are described, as are limitations or incomplete information.

Management Decisions with No Impacts to Resource: Here we describe the resource decisions that do no impact the analyzed resource.

Effects Common to All Alternatives: These sections address impacts from actions to be carried out, for that resource, under all alternatives (the impact is common to Alternatives A, B, C, and D).

IMPACTS OF THE ALTERNATIVES

ALTERNATIVE A Alternative A is the No Action Alternative. Impacts of implementing current management decisions, including those in the Omnibus Public Lands Bill and the existing *Mimbres RMP*, are analyzed here.

ALTERNATIVE B

ALTERNATIVE C

ALTERNATIVE D

Alternatives B, C, and D are the action alternatives and the impacts of implementing the actions under these alternatives are discussed here.

Chapter 4 concludes with a discussion of cumulative impacts. Cumulative impacts analyze the direct and indirect effects of the proposed action and alternatives together with the effects of the other actions that have a cumulative effect. The section considers other BLM actions, other Federal actions, and non-Federal (including private) actions (40 CFR 1508.7).

4.4 RESOURCE OR RESOURCE USE

4.4.1 PALEONTOLOGICAL RESOURCES

Assumptions and Incomplete Information: Since 1997, the BLM has issued Special Recreation Permits (SRPs) for commercial off-highway vehicle (OHV) related events in the Robledo Mountains. On average, the OHV events have 150 to 300 participants that utilize approximately 150 miles of routes within Doña Ana County. Beginning in 2008, the BLM established special stipulations to mitigate damage to exposed fossils and to monitor permitted events for comprehensive resource impacts.

Fossils have been collected from the Robledo Mountains for decades. This includes everything from trackway slabs for decorative construction to invertebrate fossils collected by school children on field trips. What effect this has had on the integrity of the paleontological resources or the information that may have been lost can never be known. Impacts on this resource can only be determined based on what is currently known and the proposed management actions for the future.

Paleontological Resources are identified as one of the resources, objects, and values for which the Monument was established and are defined as fossil resources that are predominantly Permian Age fossil material, but may be expanded to encompass subsequent discoveries. The scientific values are science-based research conducted on paleontological and geologic resources, especially Permian Age fossils and their geologic context.

Management Decisions with No Impacts to Paleontological Resources: Under all Alternatives, the following programs would have little or no impact to Paleontological Resources: Air Resources, Cultural Resources, Socio-Economic Conditions, Soils, Special Status Species, Vegetation, Visual Resources, Wildland Fire Management, and Wildlife.

Effects Common to All Alternatives:

Impacts from Paleontological Resources – Increased protection for fossil resources may lead to collectors searching for these specimens elsewhere. Stricter controls on science and research may discourage some paleontologists from studying the PTNM.

Research permits for collecting paleontological resources would continue to be evaluated and issued to qualified researchers. Continuing the research program could increase the amount of data and specimens available to researchers and our understanding of the geologic past, and this knowledge could change our way of thinking about the Permian Era. Specimens found by researchers may be exhibited and interpreted for the public allowing more people to see and understand these resources.

Impacts from Education and Interpretation – There would be opportunities to learn from the educational material on websites, educational talks, and at the local museum. Guided interpretive tours to the *Discovery Site* and other sites within the Monument would continue. This would allow for the public to experience and learn about the paleontological resources, which serves not only the objectives of education. It also serves to involve the community, which tends to increase support for the Monument.

IMPACTS OF THE ALTERNATIVES

4.4.1.1 ALTERNATIVE A

Impacts from Paleontological Resources – Casual collecting of common invertebrates occurs throughout the Monument. Since this activity is not monitored through a permit system or confined within a designated area, it is unknown to what extent these activities are impacting the paleontological resources, but paleontologists familiar with the Monument have expressed the opinion that casual collecting of common invertebrate fossils would not be detrimental to that paleontological resource. Casual and illegal collecting of scientifically significant ichnofossils or vertebrate fossils may be occurring as well, and this activity would impact research. Permitted scientific research and collecting would continue, so additional specimens would leave the Monument to be curated and/or exhibited in a repository or museum. Additional scientific information would be collected as scientists research the resources within the PTNM.

Impacts from Education and Interpretation – The lack of interpretation on-site in Alternative A limits what visitors can learn and view on their own at the Monument without a guided tour or interpretive talk.

Impacts from Recreation and Visitor Services – Under Alternative A, both non-permitted OHV use and special recreation permitted OHV events would occur within the Monument. Petroleum-based fluids (e.g., transmission fluid, power steering fluid, differential oil, etc.) sometimes leak during the course of a trail tour. Even though stipulations for OHV SRPs require mitigation to reduce the impacts from such fluid spills, there are no provisions to address similar fluid releases during non-permitted use. Petroleum-based fluid stains alter the appearance of trace fossils and plant carbon impressions contained in the red beds along the routes.

Impacts from Trails and Travel Management – Non-permitted and permitted use of motorized and mechanized vehicles would continue on 37.6 miles of trails and routes previously designated. Fossil resources are exposed on portions of the Tabasco Twister (Apache Canyon) and Patzcuaro's Revenge Trail (Branson Canyon) and documented in a 1994 monitoring report (Spencer L.; Hunt, A.; and Hotton II, N. 1994). These localities were confirmed again in an updated inventory during 2010.

The paleontological resources exposed on parts of the Tabasco Twister and Patzcuaro's Revenge Trails would continue to be subjected to the impacts of motorized vehicle use. Monitoring of these impacts has taken place yearly since 2007. Field reports, observations by BLM specialists, and data points document a gradual degradation of significant fossils and fossil beds. Fossils have been destroyed, marred, and displaced by the heavy weights of vehicles; forces exerted by tires; undercarriages scraping along fossil beds when crawling from one level to another; and dislodging equipment with crowbars. Other results are crushing, fracturing, tire scuff marks, and petroleum product staining of the red beds. The Robledo Member (Abo Tongue) sandstones hosting fossil specimens are usually fine-bedded and friable. The impact from the weight of an OHV is often sufficient to fracture or exacerbate the natural exfoliation of these thin compositional layers. Degradation of the exposed surface destroys visible fossil specimens, and compromises the integrity of the entire formation segment.

In addition to the direct impacts of OHV use on the exposed fossil beds, the indirect impacts of vehicles by-passing difficult features such as outcrops leads to disturbance of areas not previously driven on and subsequent damage to vegetation and the loosening of soils. This increases erosion and also can cause large rock slides that have been known to displace fossil layers. These landslides remove the fossils from their original context and reduce their value to scientific research.

Although the limestone block layers are generally more resistant to natural erosion, their natural bedding planes make them susceptible to fracturing along exposed seams from excessive pressure or weight. These are exactly the kind of forces imparted by OHV activity during climbing maneuvers. The results of these impact fractures are evident at the vertical obstacles located in the arroyos.

Impacts from Livestock Grazing – Under Alternative A, livestock grazing would continue. There is potential for livestock to trample paleontological resources, although unlikely, due to the location of the paleontological resources. A majority of the paleontological resources are located on the sides of steep hills or arroyos. Those resources on level ground would have the potential to be stepped on and possibly cracked or scuffed by livestock.

Impacts from Special Designations – Under Alternative A, 720 acres of the Monument were previously designated as the Paleozoic Trackways RNA. The RNA was designated for protection, research, and interpretation of paleontological values. The impact from continuing the designation of the Paleozoic Trackways RNA is a duplication of most management prescriptions from the Monument Legislation. Management prescriptions such as retain all public land, limit vehicle use to designated roads and trails, and withdrawal from mineral entry are also stated in the designating Legislation. These duplicated management prescriptions protect fossil resources by limiting actions that would have physical impacts on them.

The PTNM boundary also overlaps 789 acres of the Robledo Mountains ACEC. The ACEC is 9,190 acres and extends from its southern boundary within the PTNM north into the Robledo Mountains. The ACEC meets the relevance criteria of having significant paleontological values. Management prescriptions to protect and conserve fossils are similar to those in the RNA. The ACEC designation reinforces the need to protect and maintain the paleontological resources.

4.4.1.2 ALTERNATIVE B

Impacts from Paleontological Resources – Under Alternative B, casual collecting of common invertebrate and plant paleontological resources would not be allowed. Only BLM permitted collecting in association with scientific research would be allowed. This reduces the likelihood of scientifically significant fossils being removed illegally from the Monument and scientific information from those fossils being lost to the public and to science.

Impacts from Education and Interpretation – Under Alternative B, education and interpretation of paleontological resources would occur mostly offsite except for some self-guided interpretive activities and on-site interpretive programs. The fossils resources would remain in-situ for ongoing and future scientific research and would not be available for on-site public education and interpretation.

Impacts from Recreation and Visitor Services – Under Alternative B, SRPs would not be authorized within the Monument. This would eliminate any organized group activities other than those sponsored by the BLM. This would eliminate the impacts on the fossils from SRPs as described in Alternative A.

Impacts from Trails and Travel Management – Under Alternative B, the Monument would be closed to all motorized and mechanized use except administrative and emergency motorized use. Closing the PTNM to motorized and mechanized recreational activity would eliminate damage to fossils, as described in Alternative A, and would conserve the paleontological resources in-situ. This would contribute to the stabilization of both the fossils and their associated geological contexts. Closure of the PTNM to motorized and mechanized recreational use would remove access to PTNM resources by these recreational user groups, reduce public access, and would reduce, but not eliminate the possibility for unauthorized collecting of paleontological resources. Closure of trails to vehicle use would eliminate a

convenient, but not unique, source of recreational opportunities for the OHV and mountain bike user groups. Similar recreational venues may be found in the local Doña Ana Mountains, the Caballo Mountains, and the Las Uvas Mountains. Currently, there are no designated trail systems for either OHV or mountain bikes in these other ranges, but it is conceivable that challenging rock crawling opportunities for both motorized and mechanized vehicles could be authorized in these adjacent areas.

Trail use on foot or horseback would still allow the public to access paleontological resources.

Impacts from Livestock Grazing – Under Alternative B, livestock grazing would not be allowed; therefore, the risk of paleontological resources being damaged by livestock would be eliminated.

Impacts from Special Designations- Research Natural Area – The designation of the Paleozoic Trackways RNA would be removed, and the land would be managed under the prescriptions from the PTNM RMP. Conservation of the fossil resources would be achieved and a redundant management designation would be eliminated.

4.4.1.3 ALTERNATIVE C

Impacts from Paleontological Resources – Under Alternative C, fossil localities would be assessed to determine the best management of those sites. Such assessments would consider the importance, value, and quality of documented localities and would be used to determine the most suitable use for these localities. Some localities would be developed for interpretation and education while others would be preserved for research.

Impacts from Education and Interpretation – Under Alternative C, in addition to the off-site programs mentioned under Alternative A, pedestrian trails with kiosks and wayside exhibits and a visitor contact station would be developed, which would provide an education focusing on the paleontological resources in an outdoor setting. These developments would increase the public's understanding and appreciation of these resources. Interpretation provides the public with information that could raise their awareness of the sensitivity and importance of the resource, thereby increasing stewardship and appreciation. While this enhanced appreciation should deter theft and vandalism of the resources, increased visitor use could also increase the opportunity and occurrence of such activities. However, directing the public to appropriate locations for interpretation which are not as scientifically sensitive may keep them from seeking out scientifically-sensitive locations because their curiosity is fulfilled by the experience of being in the actual location of the resource and having the extra benefit of interpretation.

Impacts from Recreation and Visitor Services – Under Alternative C, on-site visitor facilities such as a visitor contact station, toilets, shade shelters, information kiosks, trail markers, and picnic sites would be developed. This would probably attract more visitors to the Monument. With increased visitation, more people would be able to experience the resources in a natural setting within the Monument. Increased visitation would increase the risk of theft and vandalism of the paleontological specimens by exposing fossil-bearing locations to the visiting public. The impacts from allowing SRPs would be the same as mentioned under Alternative A.

Impacts from Trails and Travel Management – Under Alternative C, within the Monument boundaries, 100 percent of the Tabasco Twister Trail (2.7 miles), and 100 percent (1.8 miles) of Patzcuaro's Revenge Trail would be closed to motorized and mechanized vehicle use (see Map 2-3). In addition, 100 percent (0.4 miles) of the Cayenne Crawler Trail would be closed to motorized and mechanized use to eliminate access from the south to Patzcuaro's Revenge Trail. Fossils located within these arroyos would be protected from these types of impacts as described in Alternative A.

For activities which do not require an SRP, a non-fee day-pass system would be established for motorized and mechanized use of designated routes. These passes would include educational information about the paleontological resources and maps of routes that are open or closed to motorized and mechanized travel.

Routes would be maintained or improved as long as sensitive resources are not impacted. Route improvement and maintenance would allow greater numbers of visitors to enjoy the interior portions of the Monument. This enhanced access would, presumably, lead to a commensurate heightened sense of public ownership and responsibility for the resources. Conversely, the easier access could lead to increases in inappropriate behavior such as littering, vandalism, and theft of fossil resources.

Impacts from Livestock Grazing – Under Alternative C, livestock grazing would continue within the Monument. If, through the Monument Monitoring Plan, it is determined that livestock are impacting the fossil resources, those areas would be fenced off from livestock to remove the direct impact. Grazing in areas not enclosed by a fence would have the same impacts on the resources as Alternative A.

Impacts from Special Designations – Impacts are the same as described under Alternative B.

4.4.1.4 ALTERNATIVE D

Impacts from Paleontological Resources – Impacts would be the same as described in Alternative C, except that limiting collection of common invertebrate fossils to BLM authorized programs would allow opportunities for discovery of fossils in an educational and recreational setting.

Impacts from Education and Interpretation – Under Alternative D, the impacts from all off-site activities would be the same as described in Alternative C except that an on-site visitor center would replace the visitor contact station and a motorized interpretive tour would be created. The visitor center and the motorized interpretive tour may appeal to a larger audience, so more people would learn about the resources located within the Monument. Education programs would lead to improved stewardship of the site through an increased appreciation of the resources. An on-site visitor center would present a greater agency presence which could help to deter vandalism and theft of fossils.

Impacts from Recreation and Visitor Services – Under Alternative D, development of recreational facilities such as a campground, primitive camping areas, toilets, shade shelters, information kiosks, trail markers, picnic sites, trails, and a visitor center would probably increase the number of visitors to the PTNM. This increase in facilities and visitors may increase the potential for looting and destruction of paleontological resources. The impacts from allowing SRPs would be the same as those discussed for Alternative A except that under Alternative D, locations allowed for OHV SRPs would be limited. The routes that are known currently to have exposed fossils would not be available for motorized or mechanized use under a SRP, eliminating damage to the exposed fossils.

Impacts from Trails and Travel Management – Impacts would be the same as under Alternative C except that the Cayenne Crawler Trail would be open for motorized and mechanized use and modified to allow access to the western portion of Patzcuaro's Revenge Trail (Map 2-4). This additional mileage would not impact the fossils in the closed portion of Patzcuaro's Revenge Trail. The absence of a pass system could result in reduced public awareness of the rules and regulations.

Impacts from Livestock Grazing – Impacts would be the same as under Alternative A.

Impacts from Special Designations – Impacts would be the same as under Alternative B.

4.4.2 EDUCATION AND INTERPRETATION

Assumptions and Incomplete Information: Off-site interpretation and educational opportunities already exist and would be expected to continue under all Alternatives. These include classroom and civic group talks and programs given by BLM staff and partners, the exhibits and programs offered at the City of Las Cruces Museum of Nature and Science (MoNaS), which opened in November 2012. The BLM has partnered with the City of Las Cruces in the development of the museum exhibits concerning the Trackways through an Assistance Agreement. Another Assistance Agreement with the City involves the development of additional exhibits and facilities at the MoNaS to encourage and facilitate visitation to the PTNM and other public land. Programs and educational materials will be coordinated between the BLM and the MoNaS, and a shared docent program will be developed.

It is assumed that in all Alternatives, except Alternative B in which access is limited to pedestrian traffic, visitation to the Monument would increase annually (USDI BLM 2013).

Two travelling trunk exhibits have been developed by the New Mexico Museum of Natural History and Science. They are available for use by other museums and educational facilities around the State. Both are currently in use at local venues. Travelling suitcase/school kits and curricula have been developed for outreach to the public schools and will be used for training staff and volunteers in conducting tours.

Education is identified as one of the resources, objects, and values for which the Monument was established and is defined as educational and interpretive opportunities on the Permian fossils.

Management Decisions with No Impacts to Education and Interpretation: Under all Alternatives, the following programs would have little or no impact to Education and Interpretation: Air Resources including Air Quality and Climate Change, Cultural Resources, Livestock Grazing, Socio-Economic Conditions, Soils, Special Designations, Special Status Species, Vegetation Management, Visual Resources, Water Resources, Wildland Fire Management, and Wildlife.

Effects Common to All Alternatives:

Impacts from Education and Interpretation – The off-site interpretation and education management actions are the same for all Alternatives. Interpretive material would be created via multiple media and so education could occur off-site. The public can learn about the Monument’s resources at presentations, talks, museum exhibits, websites, and videos but this type of interpretation would not have the backdrop of the Monument to support educational messages. The number of visitors to the Monument, the MoNaS, and to presentations on the Monument may increase over time.

Guided tours to specific sites would offer an excellent interpretive opportunity to participants. Interaction with an interpretive tour guide usually enriches the experience because a wealth of detail can be conveyed verbally while the resources are visually available. Participants can ask questions to further their knowledge and awareness of the subject matter against a natural background that provides further subject matter for interpretation. The personal interaction provided by a live tour is probably more effective in promoting stewardship from participants. Self-guided touring and exploring is also available under all Alternatives, but under Alternatives A and B, it would be very limited in terms of interpretation and education because the experience would be unassisted by directional signs and interpretive exhibits.

Impacts from Lands and Realty – Under all Alternatives, acquisition of public access easements from willing sellers would be beneficial to Education and Interpretation. Easements would provide the agency and the public legal access, which would facilitate activities such as walking and motor tours.

IMPACTS OF THE ALTERNATIVES

4.4.2.1 ALTERNATIVE A

Impacts from Paleontological Resources – Under Alternative A, the Paleontology program would continue to permit and support research. Scientific research provides baseline information which is used to develop meaningful interpretive and educational products and programs. The continuation of paleontological research would enhance and benefit the interpretive materials already available and could lead to the discovery of new specimens that could be used for exhibits (either authentic or cast replica), and the resulting information obtained from the study of such fossils would enhance existing programs. In interpreting the fossil resources of the Monument, great care would be taken to interpret and educate without causing any loss of scientific information or undue degradation of the resource. Interpreters would work closely with the paleontologists to choose appropriate specimens for off-site museum exhibits, to possibly develop exhibits located adjacent to the PTNM, and to choose appropriate interpretive destinations within the Monument. Other sites would be protected from visitation due to concerns over theft and vandalism.

Casual collecting of common invertebrates and plant paleontological resources in the PTNM has been occurring for years and is still occurring today. This is a legal activity, unlike collecting archaeological artifacts. Families and school groups have enjoyed finding and collecting small fossils and, at least in the case of the school groups, this activity is educational. Even in an unstructured context, children's imaginations are sparked by the remains of life from long ago and many of them pursue this interest on their own. However, a more structured approach (signing, making information readily available) to casual collecting would be preferable and would possibly result in fewer impacts to resources.

Impacts from Education and Interpretation – Under Alternative A, the plans for Education and Interpretation are primarily off-site. It is assumed that off-site venues within the local community would include museums, the BLM and other agency facilities, and public schools. These off-site venues would accommodate information and interpretive talks/presentations, and classroom presentations. For people not capable of accessing the resources in an outdoor setting, interpretive and educational programs in a museum or classroom setting could increase appreciation and understanding. Museum and educational experiences could lead to an enhanced visit for those people capable of visiting the PTNM. BLM-led tours to the *Discovery Site* and other sites would continue. Currently, there are no on-site interpretive facilities or opportunities within the PTNM such as exhibits or kiosks, except for a sign at the *Discovery Site*. There are no formal trails with signs to lead visitors to any location within the PTNM that has interpretable resources. This situation does not allow for any interpretation or education to occur in the Monument unless one is on a guided hike. This limits the opportunities for the public to learn on their own about the resources available in the Monument.

Impacts from Recreation and Visitor Services – Under Alternative A, there are no plans to build visitor facilities, and SRPs are allowed. On-site, self-guided interpretation and education would be limited to the *Discovery Site* which only offers an informal trail with minimal signage. Guided pedestrian tours would require hiking overland (not on a trail) to bring visitors to potential interpretive destinations.

Impacts from Trails and Travel Management – The existing routes (approximately 37.6 miles) are available for use, but no management actions are planned to improve the existing routes or add new trails and routes under Alternative A. Therefore, public education and interpretation would have to be accomplished off-site at museums, on areas adjacent to the PTNM or on-site through guided tours using informal trails and designated routes for access. Opportunities for expanding the MoNaS experience to the Monument itself, via organized tours (motorized or pedestrian), would be limited by the lack of trails

and interpretive exhibits. This would limit the on-site interpretation and educational use of the Monument.

Impacts from Lands and Realty – If non-Federal minerals were extracted, the BLM would lose the opportunity to interpret the resources located on that Federal surface.

Impacts from Lands with Wilderness Characteristics – Under this Alternative, 576 acres are identified as having wilderness characteristics. This does not impact Education and Interpretation because Alternative A does not include plans for construction of new trails or interpretive exhibits within the Monument. Guided tours in this area would still be possible under this Alternative.

4.4.2.2 ALTERNATIVE B

Impacts from Paleontological Resources – Under Alternative B, all paleontological resources would be conserved for scientific research which would have the same impacts as Alternative A. Casual collecting of common invertebrates and plant fossils would not be allowed. This would be a minor impact to Education and Interpretation because although collecting invertebrates may enhance interpretation, it is not essential for a meaningful experience.

Impacts from Education and Interpretation – Under Alternative B, the BLM would develop interpretive materials for self-guided activities and programs for guided tours. This could increase the number of visitors to the Monument and could increase stewardship towards the Monument and would increase visitor's knowledge about the PTNM.

Impacts from Recreation and Visitor Services – Impacts would be very similar to those described under Alternative A, however; there would be no on-site interpretive facilities or opportunities within the PTNM such as exhibits, kiosks or signs. Without formal trails and visitor facilities, public education and interpretation would have to be accomplished off-site at museums, on areas adjacent to the PTNM, or on-site through guided tours using informal non-motorized routes and self-guided activities. Self-guided interpretive activities would lead visitors to locations within the PTNM that have fossil resources. Improving access to the *Discovery Site* would not be possible under Alternative B thus visitors would not receive enhanced interpretation and education. Restricting casual collecting would lessen opportunities for the public to gain knowledge and hands-on opportunities with paleontological resources.

Impacts from Trails and Travel Management – Under Alternative B, the current system of routes would be closed to motorized and mechanized vehicle use. As a consequence, those routes would be unavailable for motorized interpretive tours, which could reduce both educational and interpretive opportunities. Opportunities for expanding MoNaS led tours, would be limited to pedestrian tours only and would be further limited by the lack of trails and interpretive exhibits. Hiking tours could be conducted along the existing routes; however, most of those routes do not lead to sites suitable for interpretation. Hikes across rugged terrain could reduce visitor participation in educational and interpretive activities.

Impacts from Lands and Realty – Under Alternative B, acquiring the non-Federal mineral estate would further protect the Monument from incompatible uses, thus protecting the values which the Education and Interpretation program would be founded upon.

Impacts from Lands with Wilderness Characteristics – Under this alternative, the 576 acres identified as Lands with Wilderness Characteristics would not be available for new trail construction or

exhibit installation; however, in Alternative B, there would be no plans for trails or exhibits. Guided and self-guided tours would still be possible.

4.4.2.3 ALTERNATIVE C

Impacts from Paleontological Resources – Under Alternative C, identified paleontological localities would be assessed for their educational, scientific, or interpretive values. This would facilitate the appropriate selection of sites for interpretive development and public viewing, and designate areas more appropriate for scientific research. Through assessment and data recovery processes, sites which have been determined to be non-sensitive or low-sensitive by a professional paleontologist, but having interpretive value, would be chosen for public interpretation. These sites may contain resources which are redundant, damaged or otherwise do not offer scientifically important data, or data that has already been recovered.

Impacts from Education and Interpretation – Under Alternative C, pedestrian trails with kiosks and exhibits would be developed. Increased amounts of interpretive material and opportunities would bring complicated, complex, and often obscure aspects of life on this planet to the public in a way that is easily understood. Effective interpretation enhances understanding and imparts the wonder and joy that the natural and cultural worlds contain, but is firmly based on the details of life that are often discovered only by careful scientific research and analysis. These programs are usually beneficial because they can help foster the public's appreciation and understanding, which leads them to want to protect and conserve these valuable resources. Children especially begin to develop deeper understandings of biology, geology, and other sciences and carry this into adulthood which leads to enhanced feelings of responsibility as a citizen and member of society.

Under Alternative C, exhibits for a visitor contact station and other sites would be developed to provide the opportunity for greater understanding of the paleontological resources through on-site venues. With on-site development of interpretive sites, visitors to the area would experience the resources in an outdoor setting, which provides context and could possibly increase the understanding of the resources. Through increased understanding, a greater appreciation for the tracks and trace fossils in the Monument might be developed by those visiting the PTNM. Increased understanding of the resources could lead to less trash dumping, vandalism and theft of paleontological resources.

Impacts from Recreation and Visitor Services – Under Alternative C, on-site facilities such as shade shelters, information kiosks, a trail systems with trail markers and interpretive exhibits, and a visitor contact station would be developed. Interpretive exhibits would inform the visitor about a variety of interpretive themes including the Permian environment, the existence and behavior of extinct animals, how the trackways inform scientists and the evolutionary development of reptiles and amphibians, to name only a few. Interpretive facilities would draw more visitors to the Monument, which increases the interpretive audience. A visitor contact station would serve the public by offering a sheltered location in which to hold interpretive and educational programs, possibly replica specimens, interpretive exhibits, printed materials, and possibly a sign-in kiosk. This would be very beneficial to interpretation and education because such a facility would greatly enhance the visitor's experience by offering exhibits and printed material that inform about the resources of the Monument, furthering the BLM's educational and interpretive goals. Kiosks and signing establish a management presence and this serves both the agency and the members of the public in various ways. Visitors feel more secure about an area when trails are marked and safety information is readily available. Visitors may better appreciate the public land when they are provided information. Establishing a sense of ownership in the visiting public serves to protect the public land from vandalism and theft. The agency presence also is a deterrent to these destructive

activities especially when incidences of vandalism are quickly addressed, showing that an area is not being ignored or neglected.

Impacts from Trails and Travel Management – Under Alternative C, designated trails could be developed to guide the visitor to geological and paleontological localities that illustrate interpretive concepts. Eighty-nine percent of the existing routes in which motorized or mechanized vehicle use is allowed would remain open to this use. Educational material could be included in the no-fee day-use pass that would be required for motorized and mechanized vehicle use. Formal trails and an effective interpretive/education program would assist in protecting sensitive resources by offering suitable locations that are fairly easy to access. This would satisfy the visitor's interest in viewing and experiencing exciting resources, and may also keep those visitors from seeking out locations that merit protection from the possible abuses associated with public visitation. The routes that are open under Alternative C could be used for motorized or non-motorized self-guided and guided tours by the BLM, docents, or BLM's partners.

Impacts from Lands and Realty – Public access easements would be acquired from willing sellers which would provide additional legal access points for portals to interpretive trails leading to exhibits or destinations. Acquiring the non-Federal mineral estate on lands within and adjacent to the Monument would be advantageous since the acquisition would further protect the Monument from incompatible uses, thus protecting the values which the Education and Interpretation Program would be founded upon.

Impacts from Lands with Wilderness Characteristics – Under Alternative C, 253 acres would be managed as Lands with Wilderness Characteristics (see Map 2-7). These lands would be limited from development as described under Alternative B. However, the lands outside of those managed for wilderness characteristics, such as the *Discovery Site*, would be available for the development of interpretive trails and exhibits, which would greatly increase the interpretive opportunities. Guided tours in this area would also be possible.

4.4.2.4 ALTERNATIVE D

Impacts from Paleontological Resources – Under Alternative D, the effects from the Paleontology management actions would be similar to those described under Alternative C, except that limited collecting of common invertebrate fossils without a permit would be allowed only in conjunction with BLM-approved interpretive or educational programs or activities. This would be an effective teaching tool for school-age children that could have far-reaching impacts for their educational development. Finding a fossil is an exciting event and being able to keep it provides a physical reminder of the experience.

Impacts from Education and Interpretation – The effects from the Education and Interpretation management actions would be similar to those described under Alternative C. Under D, a visitor center (effects described below) and a motorized interpretive tour would be developed. These additions would probably increase the number of visitors to the Monument since a visitor center would be universally accessible and the motorized vehicle tour would not be dependent on one's physical ability or vehicle's ability. A visitor center presents many additional and expanded opportunities and would be very beneficial to interpretation and education. Programs involving both the indoor exhibits and the outdoor exhibits could be crafted to provide a cohesive and consistent interpretive message. Visitors of all capabilities could experience the Monument within the visitor center which would be placed within the Monument and possibly close to outdoor exhibits; this would increase visitation. A motorized tour would bring the backcountry experience to more people and would bring more people to interpretive destinations, significantly increasing the educational value of the tour.

Impacts from Recreation and Visitor Services – The effects are the same as described under Alternative C with the additional actions of enhanced recreational opportunities. A visitor center would offer exhibits and activities devoted entirely to interpreting the resources of the PTNM, which would be a unique museum experience. This facility would offer the opportunity for educational programs to be conducted on-site and would assist in accommodating school and public groups visiting the PTNM. It also would serve as the launching point for many of the front-country activities such as accessing the formal trails that bring the visitor to interpretive destinations, such as in-situ fossil exhibits developed for public visitation. This would increase the number of visitors and possibly increase the stewardship of the Monument.

Impacts from Trails and Travel Management – Under Alternative D, despite the closure of certain roads used for rock-crawling, pedestrian interpretive and educational activities on these routes would still occur. New routes could be developed to enhance the visitor's interpretive and educational opportunities. For instance, if a paleontological location is selected for interpretive development but is inaccessible, this alternative allows the development of a non-motorized or motorized route to facilitate access. This would allow for more visitors to access in-situ interpretive sites.

Impacts from Lands and Realty – The impacts from Lands and Realty would be the same as discussed under Alternative C.

Impacts from Lands with Wilderness Characteristics – Under Alternative D, since no lands outside the WSA would be managed to maintain wilderness characteristics, lands with wilderness characteristics would present no restraints to developing interpretive trails and exhibits.

4.4.3 RECREATION AND VISITOR SERVICES

Assumptions and Incomplete Information: Under Alternatives C and D, a visitor contact station and a visitor center were analyzed; however, there is no one obvious location for these facilities and the analysis is based on the opportunity to explore several locations inside and bordering the Monument. Any future BLM decisions for these facilities would consider legal and physical access, ecological impacts, and proximity to paleontological sites, and recreational trails.

Under Alternative C, a visitor contact station is analyzed. The visitor contact station would be a minimal facility that is ABA (Architectural Barriers Act of 1968) accessible. It could be a large shade structure (approximately 50 feet by 50 feet) with a set of wayside exhibits and panels. A parking area for 15 cars would cover about 20,000 square feet of surface. Pit toilets would be installed. The footprint for the contact station, parking lot, wayside exhibits and toilets would be about 1 to 1½ acres. The estimated range of cost for this type of infrastructure would be approximately \$240,000.

The visitor contact station may or may not be staffed by BLM employees at regular times and could be used to hold interpretive programs. It would be a place where visitors can learn about the Monument, feel like they have had contact with the resources, and learn why it was made into a National Monument.

Under Alternative D, a visitor center is analyzed. A visitor center would be an ABA accessible building that would be staffed with regular hours of operation. It would have paleontological and geological specimen exhibits and interpretive displays. The facility would have indoor bathroom facilities, electricity, and plumbing. The footprint of this building and parking lot would take up about 1½ to 2 acres. Cost estimate for a 2,500 to 3,000 square foot building, a paved park area for 30 cars, and a maintained gravel road, is approximately \$2,000,000.

A visitor center would require a greater number of staff members to maintain the facilities and manage the visitor center with regular hours of operation.

Under the authority of the Federal Lands Recreation Enhancement Act (REA), the BLM uses the Special Recreation Permitting system to satisfy recreational demands within allowable use levels in an equitable, safe, and enjoyable manner while minimizing adverse resource impacts and user conflicts for all public land. All SRP applications will be analyzed with an elevated consideration of protecting the Monument Objects. Environmental Assessments (EAs) have been completed for previous SRPs and events held within the Monument. As a part of the SRP process, BLM monitors SRP events, completes post-event assessments, and evaluates whether the events adhered to the Legislation. Further studies have not been completed to assess the number of OHV SRPs that could be issued annually while still protecting the Monument's fossil resources.

Vehicle counters have been placed at three major access points into the Trackways. One of the counters placed at a major access point to the Monument, near the eastern boundary, counted over 10,000 vehicle crossing it in a year. However, the exact number of visitors then crossing into the Monument is difficult to determine, because there are several other routes for vehicles to enter and leave the Monument. The accepted conversion for visitor trips based on vehicle counts is 2.5 visitors per car. The BLM estimates that somewhere between 40 to 60 percent of the vehicles that crossed the vehicle counter actually entered into the Monument proper, or 10,000 to 15,000 people. Visitors entering the Monument as hikers or on mountain bikes were not counted.

It is assumed that in all Alternatives, except Alternative B in which access is limited to pedestrian traffic, visitation to the Monument would increase annually (USDI BLM 2013). Under Alternative B, with the

elimination of motorized and mechanized use, the number would probably drop to less than current visitation. If under Alternative C a visitor contact station, interpretive facilities, and recreational trails were put in, it is assumed visitation would increase substantially annually. If under Alternative D, a visitor center is put in along with interpretive facilities and recreational trails, it is assumed visitation would increase more than in the other alternatives.

Recreation is identified as one of the resources, objects, and values for which the Monument was established. The specific recreational resources managed under this category are those which relate to the enjoyment, appreciation, and protection of the fossil resources and their geologic context. Other types of recreational uses (for example, OHV use, camping, and mountain biking) are allowed to the extent that they do not conflict with management of Paleontological Resources.

Management Decisions with No Impacts to Recreation and Visitor Services: The following resources or uses have no or little impact on Recreation and Visitor Services: Cultural Resources, Livestock Grazing, Special Designations, Special Status Species, Vegetation Management, Visual Resources, and Wildlife.

Effects Common to All Alternatives:

Impacts from Lands and Realty – Under all Alternatives, the BLM would continue with the current management prescription for acquiring legal public access.

IMPACTS OF THE ALTERNATIVES

4.4.3.1 ALTERNATIVE A

Impacts from Paleontological Resources – Under Alternative A, casual collecting of common invertebrates and plant paleontological resources would be allowed to continue. Paleontologists familiar with the Monument have expressed the opinion that casual collecting of common invertebrates would not be detrimental to the resources. Under the Paleontological Resource Protection Act, this type of collecting is allowed.

Impacts from Education and Interpretation – Under Alternative A, the BLM would continue interpretation partnerships with museums and other entities to develop interpretive materials for programs and events and have tours led to the fossil sites. The Monument's paleontological resources are very subtle and challenging to detect. On-site tours and interpretive programs would facilitate the visitor experience and increase their understanding of the resources within the Monument. The lack of on-site interpretive and educational exhibits and facilities would limit visitors' abilities to intellectually and emotionally connect with the fossil resources of the Monument.

Impacts from Recreation and Visitor Services – Under Alternative A, there are no plans to develop visitor facilities within the Monument. The Monument's desert environment is prone to extreme heat in the late spring, summer and early fall. This environment combined with the lack of comfort facilities in and around the Monument would likely deter or limit family groups, school groups and other visitors who might be in need of bathrooms and shade shelters. Lack of development and facilities would increase the opportunity for visitors seeking a recreation experience in a less crowded and more natural setting. Under this Alternative, visitor use is expected to decrease. Lack of facilities and developed access under this Alternative may deter visitors with certain kinds of disabilities or limit their recreation opportunities. Over time, the absence of toilet facilities may create challenges associated with managing human waste.

Discharge of firearms is allowed under Alternative A. Hunters would continue to use the *Planning Area* in accordance with New Mexico Department of Game and Fish regulations. Target shooters would continue to use the Monument for their activities. However, the BLM acknowledges that there is a safety risk of inviting the public and researchers to the Monument and continuing to allow recreational target shooting throughout the same area within Alternative A. Target shooting is a safety concern for recreationists, tourists, researchers, BLM staff and volunteers. The issue arises when recreational shooters utilize the area for the discharge of firearms concurrent with public visitation to the Monument, as well as BLM-sponsored educational events. The BLM events include guided educational programs for local elementary, middle-school and high schools, as well as other guided hikes by the BLM and other entities. The events may take place adjacent to areas being used for target shooting, and the BLM has documented near misses as well as an unwillingness by target shooters to cease while school busses are unloading or other visitors are beginning their hikes. Students, law enforcement officers, and other visitors have been in close proximity to bullets shooting by.

The BLM evaluated target shooting in certain areas of the PTNM in terms of public safety. The Las Cruces District Office analyzed industry standards for predictable projectile safety areas (Appendix G). From this data, the BLM concluded that a ½-mile safety zone (no target shooting) around areas where people congregate within the Monument is appropriate. Consistent with this analysis, the BLM applied the same ½-mile safety buffer zone around those locations within the Monument where people congregate such as paleontological resources (researchers, BLM staff, and tourists, etc.) and routes.

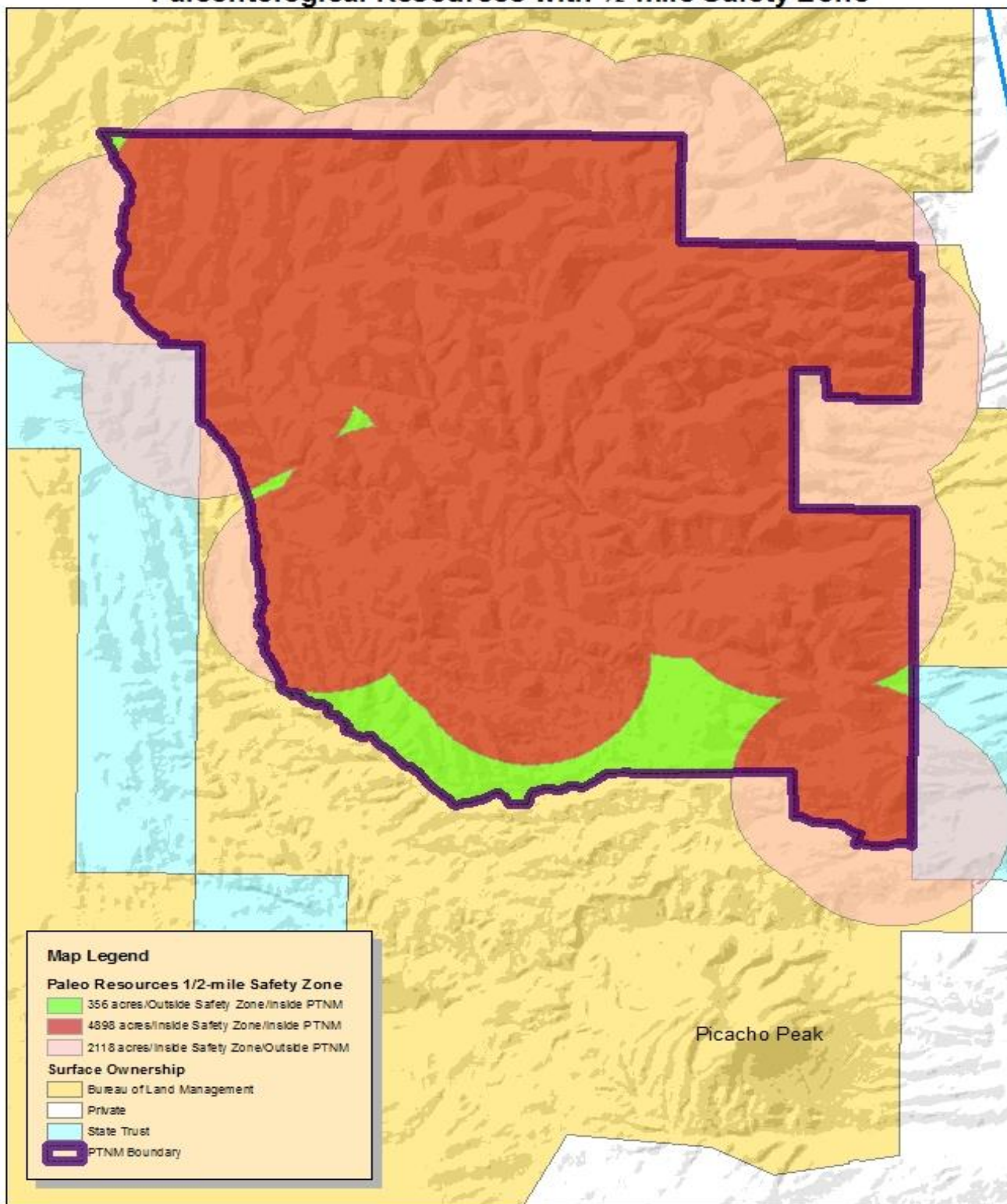
Within the Monument, visitors and researchers often congregate near the paleontological resources. Further, the BLM authorizes scientific exploration and academic research in the PTNM and surrounding areas. The researchers are working throughout the day, often crouched in a low-visibility position at the many paleontological sites located within winding arroyos. This can leave the researchers and other members of the public screened from above, or within, the arroyos. Unintentional bullet ricochets or misfires would present an unnecessary risk to public safety in the area.

This mapping exercise reveals that the safety buffer zones associated with protection of public access to paleontological sites incorporates 93 percent of the Monument. Approximately 356 acres, or 7 percent, of the Monument near the southern boundary lies outside the ½-mile buffer zones associated with paleontological sites. (In conformance with the Paleontological Resources Protection Act, paleontological sites are not displayed on the associated maps.)

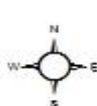
Another set of locations in the Monument where people congregate are designated recreational routes. The area within the Monument includes 32 miles of designated off-highway vehicle (OHV) trails having National recognition as prime and challenging trails for extreme off-roading and rock crawling enthusiasts. These trails are the destination for recreation activity rather than access routes to recreation destinations beyond. The OHVs move slowly over extended periods of time, with people often congregating and walking alongside the vehicles. Recreational target shooting would put these visitors at unnecessary risk. The BLM applied a ½-mile buffer around designated recreational routes in Alternative A. Map 4-2 shows 67 acres, or approximately 1 percent of the Monument lies outside of the ½-mile safety zones associated with designated recreational routes.

The ½-mile buffer zones associated with paleontological resources (Map 4-1) and designated routes (Map 4-2) were merged to determine where recreational shooting could be considered safer in the Monument. However, these two sets of safety zones cover the entire Monument (Map 4-3), indicating that there are no areas in the Monument that are more than ½-mile from areas of high public use where recreational target shooting could take place safely. In addition to areas where the public congregate, the soil surface throughout the Monument has a high rock content (see Soils section in Chapter 3) which would further increase unnecessary risk to visitors from the potentially increased number of ricochets.

**Map 4-1 Recreation and Visitor Services
Paleontological Resources with ½-mile Safety Zone**



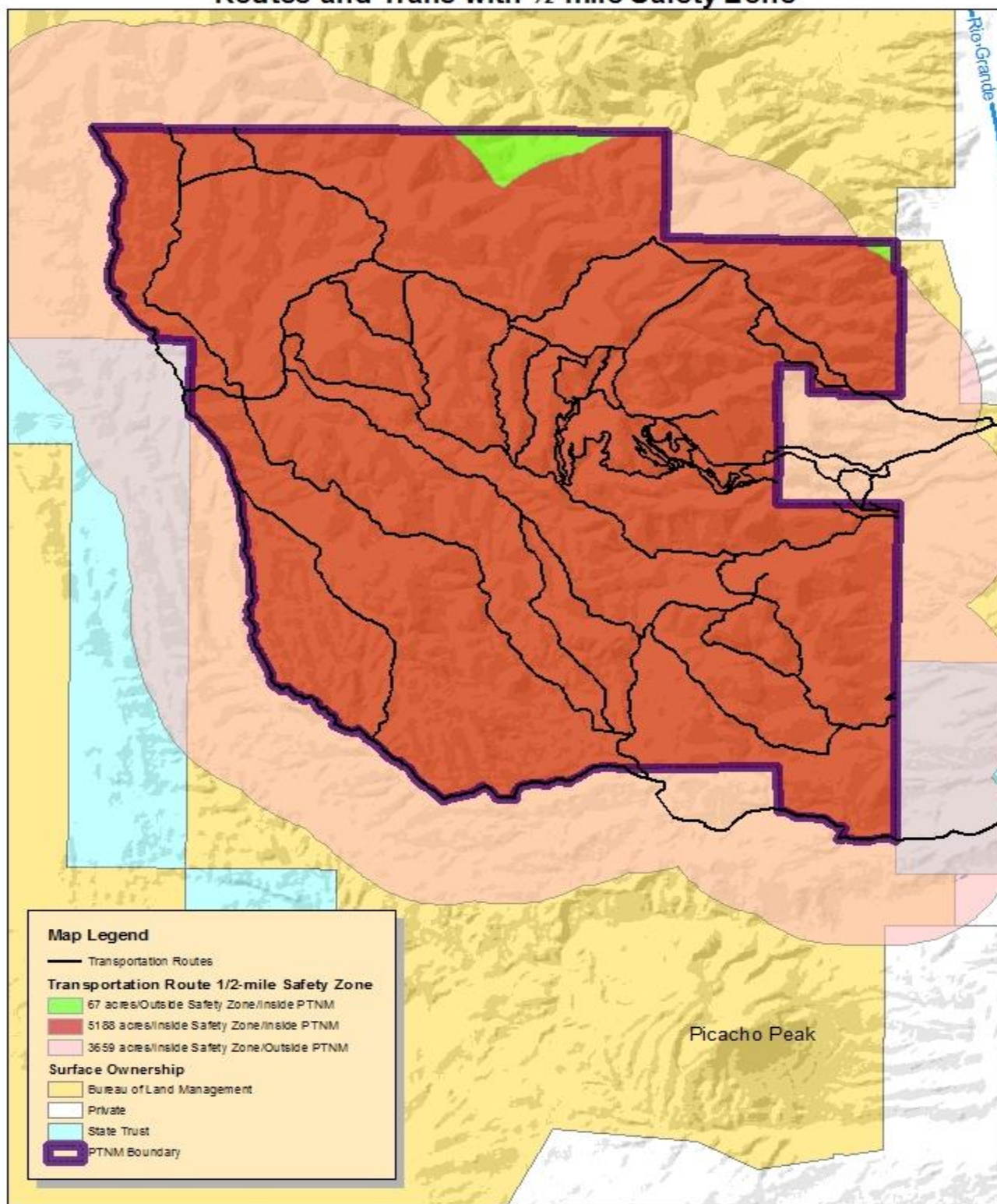
No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by the BLM. Spatial information may not meet National Map Accuracy Standards. This information is subject to change without notification.



0 0.5 1 Miles

Projection: UTM Zone 13
Datum: NAD 1983

**Map 4-2 Recreation and Visitor Services
Routes and Trails with ½-mile Safety Zone**



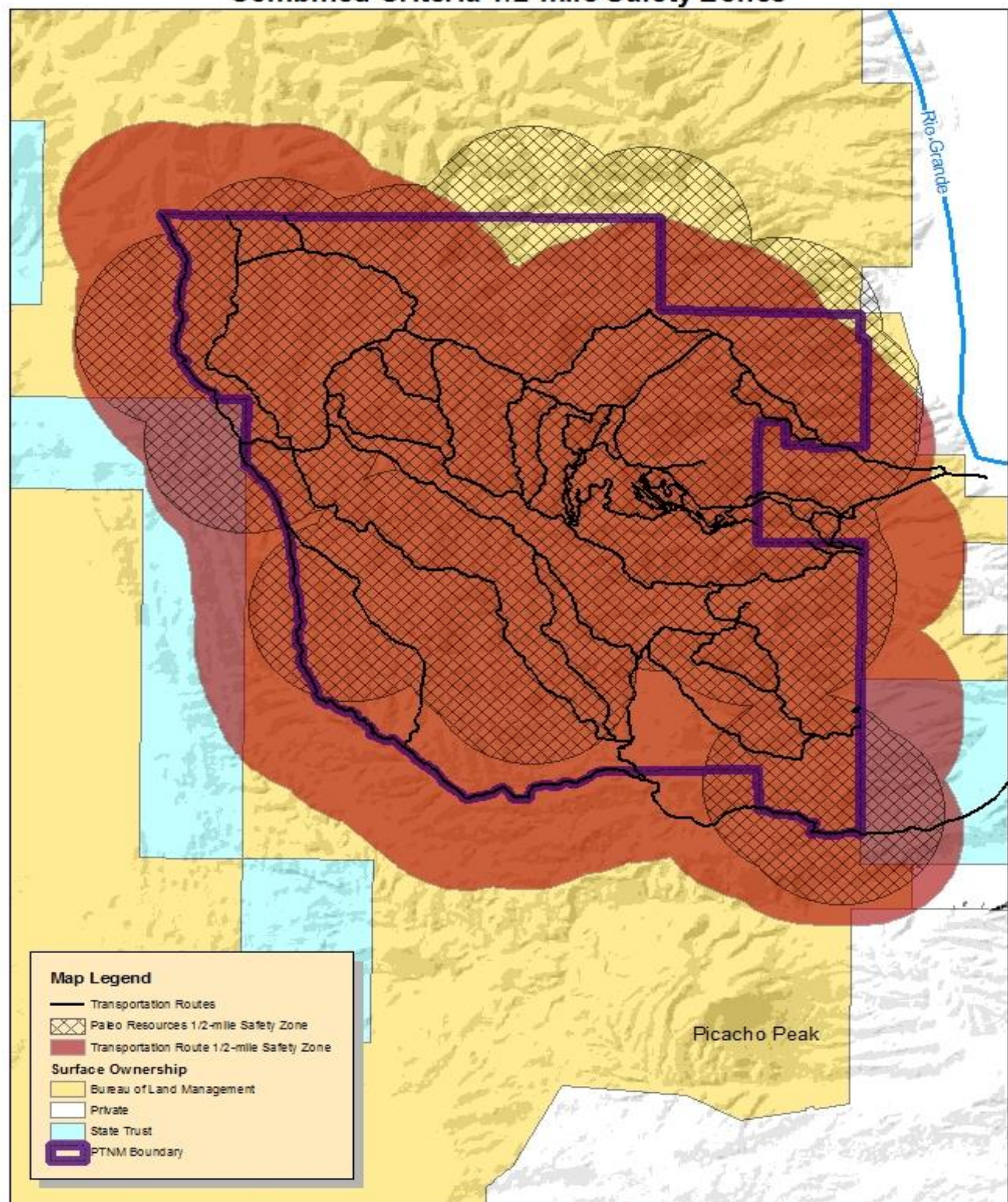
No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by the BLM. Spatial information may not meet National Map Accuracy Standards. This information is subject to change without notification.



0 0.5 1 Miles

Projection: UTM Zone 13
Datum: NAD 1983

**Map 4-3 Recreation and Visitor Services
Combined Criteria 1/2-mile Safety Zones**



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by the BLM. Spatial information may not meet National Map Accuracy Standards. This information is subject to change without notification.



0 0.5 1 Miles

Projection: UTM Zone 13
Datum: NAD 1983

Under Alternative A, SRPs would continue to be authorized on a discretionary basis. Continuing to authorize SRP events and related activities would provide a means to manage visitor use, enhance the recreation experience, and promote land stewardship. Permitted activities would also result in short-term impacts such as increased noise, crowds, and associated visitor use conflicts.

Impacts from Trails and Travel Management – Alternative A would continue to provide OHV access over approximately 32 miles of the Robledo Mountain OHV Trails (commonly known as the Chile Challenge Trails). These routes primarily benefit specialized, high-clearance off highway vehicles. This Alternative would maximize OHV access and related recreation opportunities.

The 6.2-mile SST Mountain Bike Trail would remain and continue to provide an opportunity for both individual and group biking activities (5.5 miles are within the Monument boundary).

Alternative A does not specifically plan for additional development of separate hiking, pedestrian, and horse trails. However, portions of vehicle routes or most arroyo and canyon bottoms could be used by those who want to explore the Monument on foot or horseback. Dispersed hiking and equestrian activity would continue throughout the Monument and allow visitors the opportunity to discover and explore. Access along the trail to the original *Discovery Site* that hugs the base of the north side Community Pit spoils pile would remain closed due to safety concerns resulting from the proximity of the trail to unstable spoils piles and debris. The absence of well designed, convenient trails impacts visitor interest and ability to reach the desired destination.

Impacts from Lands with Wilderness Characteristics – Under this Alternative, the 576 acres identified as lands with wilderness characteristics would be available for recreational development.

4.4.3.2 ALTERNATIVE B

Impacts from Paleontological Resources – Under Alternative B, casual collecting of common invertebrates and plant paleontological resources would not be allowed. This would disappoint visitors and school students collecting common invertebrate fossils. This may reduce the number of visitors and students that would want to visit the Monument.

Impacts from Education and Interpretation – Under Alternative B, interpretation and education allows for continued partnerships with museums, BLM and partner-led interpretive tours to fossil sites, and development of interpretive materials for programs and events. On-site tours and interpretive programs would help facilitate the visitor experience and help the visitor relate to and understand the resources of the Monument. Only minimal directional and informational signs would be installed. Visitors (not a part of guided tours) would have a challenging time finding paleontological sites and connecting with the resources on self-guided visits to the Monument.

Impacts from Recreation and Visitor Services – Installation of minimal directional and informational signs would facilitate exploration and discovery, and increase visitor safety by reducing the opportunity for visitors to lose their way. The effects of forgoing development of additional recreation and visitor facilities are the same as under Alternative A. Due to the lack of motorized and mechanical recreational use in this Alternative, it is assumed that visitation would drop.

Under Alternative B, hunting would continue in accordance with New Mexico Department of Game and Fish regulations and recreational target shooting would continue. The analysis of recreational target shooting in Alternative A and Map 4-1 applies as well to Alternative B. Because Alternative B would close the PTNM to motorized and mechanized vehicle use, the analyses found in Maps 4-2 and 4-3 do not

apply to Alternative B. In the southern portion of the Monument, approximately 356 acres (or 7 percent of the Monument) lie outside the ½-mile buffer zone around fossil sites. This area does not have access. In addition, because Alternative B does not include increased access to the PTNM, the 356 acres identified outside the buffer zone cannot be reached by vehicle. Reaching this area would be a challenge for both target shooters and BLM rangers. If target shooters reached this area by foot or horseback, researchers, BLM staff, and the visiting public in the same area remain at risk from stray bullets.

The BLM acknowledges that there is a safety risk of inviting the public and researchers to the Monument and continuing to allow recreational target shooting throughout the same area. With no motorized or mechanized access with this Alternative, there would be fewer people within the Monument and probably less risk to public safety than with Alternative A.

The effects from lack of recreation and visitor facilities under this Alternative is the same as under Alternative A.

Impacts from Trails and Travel Management – Under Alternative B, the Monument would be closed to motorized and mechanized vehicle use. This would close the 32 miles of the Robledo Mountains OHV Trails (Chile Challenge Trails) and 5.5 miles of the SST Mountain Bike Trail. Eliminating the use of motorized and mechanized vehicles would essentially close the Monument to a large portion of its recreational user groups. OHV enthusiasts and mountain bikers would likely continue to pursue their recreational interest in other areas.

Closing the Monument to motorized and mechanized use would increase and enhance the recreational opportunity for those seeking a quiet and natural recreation setting (e.g., fewer signs of vehicle activity such as tire tracks, oil spills, broken rocks, etc.)

Under Alternative B, there are no plans to develop hiking or horse trails. With the exception of portions of the existing vehicle trail system, hiking and equestrian opportunities would be limited primarily to cross-country use. Access along the trail to the original *Discovery Site* tracksite that hugs the base of the north side Community Pit spoils pile would remain closed due to safety concerns resulting from the proximity of the trail to unstable spoils piles and debris. As in Alternative A, the absence of developed hiking trails to points of interest in the Monument, discourages casual investigation by the public.

Impacts from Lands and Realty – The BLM would acquire the non-Federal minerals within the Monument. This would eliminate the possibility of disturbance to the surface from extraction of the subsurface minerals and a subsequent reduction in recreational opportunities on those lands.

Impacts from Lands with Wilderness Characteristics – Under this alternative, the 576 acres identified as Lands with Wilderness Characteristics would not be available for recreational development. Instead, recreational development such as trails and recreational facilities would occur in other areas of the Monument, minimally impacting the lands identified as having wilderness characteristics.

4.4.3.3 ALTERNATIVE C

Impacts from Paleontological Resources – Under Alternative C, the effects would be the same as those discussed in Alternative B.

Impacts from Education and Interpretation – As in Alternatives A and B, interpretation and education allows for continued partnerships with museums, BLM and partner-led interpretive tours to fossil sites, and development of interpretive materials for programs and events. This would have the same beneficial effects discussed under the previous alternatives.

Under Alternative C, there would be pedestrian trails developed with orientation kiosks and wayside exhibits, along with developed exhibits for on-site interpretation and a visitor contact station. These would benefit those visitors trying to understand and relate to the resources of the Monument. On the other hand, such facilities might detract from the natural and wild settings of the Monument if these interpretive developments are too frequent or too conspicuous.

Impacts from Recreation and Visitor Services – Alternative C, provides for the possibility to develop, install, and maintain a variety of visitor facilities (i.e., a visitor contact station, toilets, shade shelter, information kiosks, and picnic sites). This level of development would increase visitor comfort, visitor use, and overall opportunities for those seeking a more developed, safe and controlled recreation setting (e.g., school and tour groups). Due to the development of facilities and the opportunities for education and interpretation, visitation would be expected to increase dramatically (BLM 2013). This level of development would also reduce the opportunity for those seeking a less crowded and more natural recreation setting.

Under Alternative C, motorized and mechanized vehicle users would be required to obtain a no-fee day-use permit. Registering online or driving to the BLM office for a permit would result in an inconvenience and require additional planning. In the short-term, vehicle users who are unaware of the permit requirement would either have to cancel their trip or return to the Las Cruces BLM office to obtain a permit. When obtaining the permit, maps and safety information would direct visitors to trails and the location of interpretive and educational sites. A permit system would also provide the BLM accurate visitor use data to better plan and manage future vehicle-use.

Under Alternative C, recreational target shooting would be prohibited. The Las Cruces District Office analyzed industry standards for predictable projectile safety areas and these results are found in Alternative A and in Appendix G. The analysis demonstrates that there are no areas in the Monument that are more than ½-mile from areas of high public use where recreational target shooting could take place safely.

Closing the Monument to recreational target shooting would slightly decrease the number of opportunities for this activity in the *Analysis Area*. However, the public land in Doña Ana County outside of the Monument is available for recreational target shooting (unless closed under Supplemental Rules at developed recreation areas). There are approximately 1,069,757 acres, or 44 percent, of Doña Ana County that are available for recreational target shooting. In addition, there is a public shooting range 12 miles to the west of the PTNM on BLM land that is operated by the City of Las Cruces, which is free to the public for target shooting. The BLM currently permits this shooting range, the Butterfield Range, to the City of Las Cruces under a Recreation and Public Purposes Act lease. This is an excellent shooting facility and readily accommodates a wide variety of safe shooting venues for the public.

Prohibiting target shooting would increase visitor and BLM staff safety by reducing risks associated with stray bullets. It would also eliminate the litter left by target shooters, and reduce the opportunity for user conflicts. As Monument visitation increases over time, the conflict between target shooters and other visitors would increase if the Monument was not closed to recreational target shooting. Closing the Monument to target practice shooting would create a safer environment for researchers, visitors and BLM staff and volunteers.

Impacts from Trails and Travel Management – Under Alternative C, approximately 26.9 miles of the Robledo Mountains OHV Trail routes would remain open to motorized and mechanized vehicle use and 5.4 miles would be closed. Open vehicle routes would provide recreational opportunities for those who are unable to hike cross-country and through rugged terrain, taking visitors closer to various fossils and interpretive sites. The closure of 5.4 miles of trail used by OHV rock crawling enthusiasts would

inconvenience and disappoint this user group. While other challenging routes would remain open with a day-use pass, these segments are highly valued because of their level of extreme difficulty. Closure of the 5.4 miles might discourage some OHV owners from using the Monument and overall rock crawling would decrease. Closing the segments of trail would increase and enhance the recreational opportunity for non-motorized users seeking a quieter and more natural recreation setting.

Under Alternative C, the 5.5 miles of SST Mountain Bike Trail would remain open for mountain biking with a no-fee day permit. This Trail would continue to provide a quality recreation opportunity.

Alternative C provides an opportunity to identify, construct and maintain new routes for biking, hiking, and equestrian and OHV activity. An expanded trail system would increase access and associated recreational opportunities for both motorized and non-motorized travelers. Additional trails would enhance the recreation experience by increasing access to fossil sites, scenic views, geological formations, and other values for which the Monument was designated. An expanded trail system and related activity may deter those seeking a recreation experience in a less crowded and more natural setting.

Impacts from Lands and Realty – Under Alternative C, the BLM also would acquire access easements for public use. The increase of legal access points would allow multiple entry points and open the Monument up to more people. This could lead to several impacts such as increased vandalism and trash throughout the Monument and increased recreational destinations and opportunities.

Impacts from Lands with Wilderness Characteristics – Under Alternative C, 253 acres would be managed as Lands with Wilderness Characteristics. Management of these lands would limit man-made intrusions as described under Alternative B. However, the remaining lands would be available for the development of recreational facilities which could greatly increase the recreational opportunities within the Monument. The *Discovery Site* is within those remaining lands (not to be managed as Lands with Wilderness Characteristics); therefore it would allow greater interpretation of that site and the ability to build trails for better access to it.

4.4.3.4 ALTERNATIVE D

Impacts from Paleontological Resources – Under Alternative D, collecting of common invertebrate fossils would only be allowed in conjunction with BLM authorized interpretive or educational activities and programs in areas of the Monument identified by BLM Paleontologists for this use. Designating areas for collection of common invertebrates would significantly reduce the likelihood of the removal of a fossil important for scientific research.

Impacts from Education and Interpretation – Interpretation and education allows for continued partnerships with museums, BLM and partner-led interpretive tours to fossil sites, and development of interpretive materials for programs and events. This would have the same effects as discussed under Alternatives A and B.

Under Alternative D, there would be pedestrian trails developed with orientation kiosks and wayside exhibits, along with developed exhibits for on-site interpretation. These would have the same impacts as discussed under Alternative C.

Under Alternative D, BLM may create an on-site visitor center. This would provide an avenue for strong interpretation and BLM presence in the Monument. However, a visitor center requires regular staff hours, maintenance, and a significant financial obligation. It would also detract from the experience of those seeking a wilder, more natural setting. The impact to the natural setting from any facilities proposed

(kiosks, exhibits, visitor center) would be minor considering how few acres these facilities would take up compared to the number of acres that would be without facilities.

Impacts from Recreation and Visitor Services – Impacts under Alternative D are the same as under Alternative C. Installation of a campground and visitor center would increase visitor use and significantly increase BLM’s financial obligation with regard to capital investments, staffing, and facility maintenance.

Installation of a visitor center would provide the BLM an on-site opportunity to offer exhibits and activities devoted entirely to interpreting the unique paleontological resources of the PTNM. A visitor center would also provide a venue to conduct on-site educational programs that would better accommodate larger groups (e.g., schools, tours, family, etc.). Overall, this level of development would benefit those seeking a more comfortable, social, and controlled recreation setting. This level of development would also reduce the opportunity for those seeking a recreation experience in a less crowded and more natural setting.

Under Alternative D, recreational target shooting would not be allowed. This would have the same impacts as described under Alternative C.

Impacts from Trails and Travel Management – Under Alternative D, approximately 28.3 miles of the Robledo Mountains OHV Trails would remain open to motorized and mechanized use and 4.0 miles would be closed. This closure would affect the extreme OHV recreationists as these routes are considered to be some of the most challenging for rock crawling. Under this Alternative, 0.9 miles of Branson Canyon would remain open for rock crawling by re-configuring Cayenne Crawler from an “*up only*” to a “*down only*” direction, thus allowing OHV access to the upper portion of Branson Canyon (Patzcuaro’s Revenge Trail) which would allow a desirable rock crawling opportunity not offered in Alternative C. The rest of the impacts would be the same as described under Alternative C.

Under Alternative D, the 5.5 miles of SST Mountain Bike Trail would remain open for mountain biking, and impacts would be the same as those described in Alternative A.

Alternative D provides an opportunity to identify, construct, and maintain new trails for biking, hiking, and equestrian and OHV activity. An expanded trail system could lead recreationists and visitors to fossil sites, scenic views, geological formations and other qualities and values for which the Monument was designated. This would provide greater opportunities for a quality recreation experience for hikers, horseback riders, OHV users, bicyclists, and sightseers.

Impacts from Lands and Realty – Under Alternative D, the impacts are the same as discussed under Alternative C.

Impacts from Lands with Wilderness Characteristics – Under Alternative D, no land outside the WSA would be managed to maintain wilderness characteristics; therefore, recreational facilities may impact those characteristics.

4.4.4 TRAILS AND TRAVEL MANAGEMENT

Assumptions and Incomplete Information: Public interest in both recreational and scientific/educational access to the Monument is assumed to increase with advertisements of its unique and significant characteristics.

Management Decisions with No Impacts to Trails and Travel Management: The following resources or uses have little or no impact on Trails and Travel Management: Air Resources, Cultural Resources, Livestock Grazing, Socio-Economic Conditions, Special Status Species, Vegetation Management, Visual Resource Management, Wildland Fire Management, and Wildlife.

Effects Common to All Alternatives:

Impacts from Paleontological Resource – Under all Alternatives, if the PTNM Authorizing Officer determines that OHV use would cause or have the potential to cause adverse impacts to specific paleontological resource sites, then an area could be closed to travel or travel restrictions may be imposed.

Impacts from Trails and Travel Management – Under all Alternatives, casual, dispersed pedestrian and equestrian use are allowed. This allows for hikers and equestrian users to traverse the Monument as they please. They are not bound to any route.

Impacts from Lands and Realty – Under all Alternatives, the BLM would attempt to acquire public access easements for public use from willing sellers. This would allow for legal access for the public and administrative use into the Monument.

Impacts from Special Designations-Area of Critical Environmental Concern (ACEC) – The Robledo Mountains ACEC limits all vehicle use to designated roads and trails. For the portion of the ACEC within the Monument, there are no roads or trails; therefore there would be no vehicle use within the ACEC portion of the Monument. All travel within the ACEC would have to be on foot or on horseback, which reduces the number of people who would visit this part of the monument.

IMPACTS OF THE ALTERNATIVES

4.4.4.1 ALTERNATIVE A

Impacts from Paleontological Resources – Under Alternative A, casual collecting of common invertebrates and plant paleontological resources would be allowed to continue. This may encourage the public to drive on undesignated roads to get to invertebrate fossils, thus creating illegal routes within the Monument. Due to rough routes, the traffic to find invertebrate fossils would be primarily pedestrian.

Impacts from Education and Interpretation – Under Alternative A, off-site interpretation and education would continue as would BLM-led tours to the *Discovery Site* and other sites. The off-site education program does not cause an impact on travel management, but there are requests for tours within the Monument. Construction of new routes and maintenance of existing routes would not be planned. This Alternative allows for tours on the existing routes or arroyos, but they are not the most accessible or easy to hike. As interpretive tour requests increase, the need for maintained trails would increase. Lack of scheduled route or trail maintenance or construction would hinder access to the Monument for those interested in learning about the resources and enjoying an easy stroll.

Impacts from Recreation and Visitor Services – SRPs would continue to be authorized. This would allow commercial, competitive, and organized groups to continue to conduct various events. Most of the SRPs are for OHV events on the designated routes. This Alternative continues to allow for OHV SRPs, which provides a highly sought after OHV experience.

Impacts from Trails and Travel Management – Under Alternative A, motorized and mechanized use is limited to approximately 37.6 miles of designated routes. These routes provide excellent opportunities to experience the Monument on a daily basis with minimal restrictions. Those that have high clearance vehicles capable of negotiating the challenges of these routes can experience a first class OHV or mountain bike experience. However, the lack of scheduled improvement or maintenance of routes and trails reduces the ease of access for educational and some recreational uses. There is little or no opportunity for low-clearance vehicles to access the Monument.

Impacts from Lands and Realty – Under Alternative A, the impacts are the same as those stated in *Effects Common to All Alternatives*.

Impacts from Lands with Wilderness Characteristics – Under Alternative A, there would be no impacts to trails and travel management from Lands with Wilderness Characteristics.

Impacts from Special Designations-Research Natural Area (RNA) – Under Alternative A, the RNA designation would remain, which has the following prescriptions that impact trails and travel management: limit vehicle use to designated roads and trails and manage for Recreation Opportunity Spectrum (ROS) semi-primitive non-motorized class. This designation allows motorized recreation on designated routes and non-motorized use in the RNA. These management prescriptions still allow access to the Monument for recreation, research, and administrative use.

4.4.4.2 ALTERNATIVE B

Under Alternative B, motorized and mechanized use of the routes would not be allowed within the Monument, except for administrative, permitted, and emergency use. There would be no impacts from other resources to trails and travel management.

4.4.4.3 ALTERNATIVE C

Impacts from Paleontological Resources – Under Alternative C, route use may decrease from some members of the public that use the area for casual collection of fossils. The use of routes for permitted collection would increase.

Impacts from Education and Interpretation – Under Alternative C, a hiking trail system with kiosks would be developed. A visitor contact station could be developed, thus access to the station would be necessary. These may add routes to the Comprehensive Trails and Travel Management (CTTM) Plan (Appendix C) and workload to a maintenance schedule. Through the interpretive hiking trails, the public could access and understand the fossils more easily.

Impacts from Recreation and Visitor Services – Under Alternative C, the BLM could prepare an activity plan to identify, construct and maintain new trails for biking, hiking, equestrian, and OHV activity. An expanded trail system would increase access for both motorized and non-motorized travelers. An activity plan would locate sites to develop visitor facilities. Routes changes would be incorporated into the CTTM Plan for the Monument (see Appendix C). All developments would be done in compliance to the NEPA process.

Impacts from Lands and Realty – Under Alternative C, acquisition of access easements would trigger a revision of the CTTM Plan (Appendix C). More access points into the Monument would improve the visitor experience. The CTTM Plan would have to balance the need for access and the need for resource protection. As access opportunities increase, the BLM would undertake more administrative responsibility for maintaining and managing the use of these easements.

Impacts from Lands with Wilderness Characteristics – Under Alternative C, approximately 253 acres within the Monument would be managed for protection of the wilderness characteristics. Since there are no trails, roads or interpretive exhibits planned within this area, there would be no impacts to trails and travel management. The area would remain open for dispersed non-motorized, non-mechanized travel, so hiking and horseback use would continue.

Impacts from Visual Resources – Under Alternative C, VRM Class objectives I and II would influence the location and degree of any proposed trail construction. Construction of new trails would have to meet the objective to either preserve (VRM Class I) or retain (VRM Class II) the existing character of the landscape. Any newly created visual contrasts would have to be low (Class II) or very low (Class I). These constraints would require careful trail design and location and may prohibit trail construction altogether in some locations.

4.4.4.4 ALTERNATIVE D

Impacts from Paleontological Resources – Under Alternative D, casual collection of common invertebrates and plant fossils would not be allowed. Collecting of common invertebrate fossils would only be allowed in conjunction with BLM authorized interpretive or educational activities and programs. This would direct groups to specific locations, which may result in the need for improved access, and may cause additional wear on the routes.

Impacts from Education and Interpretation – Under Alternative D, in addition to the actions and impacts stated in Alternative C, an on-site visitor center (instead of a visitor contact station) and a motorized interpretive tour route may be developed. These actions create a more developed Monument triggering a revision to the CTTM Plan to include more or improved travel facilities. Alternative D would allow easier access to portions of the Monument, benefitting those that have low-clearance vehicles. Those that enjoy the more challenging OHV routes would not see the improvements as an enhancement.

Impacts from Recreation and Visitor Services – Impacts are the same as under Alternative C.

Impacts from Lands and Realty – Impacts are the same as under Alternative C.

Impacts from Lands with Wilderness Characteristics – Impacts are the same as under Alternative A.

Impacts from Visual Resources – Impacts are the same as under Alternative C.

4.4.5 AIR RESOURCES

4.4.5.1 AIR QUALITY

Assumptions and Incomplete Information: Air quality data is limited within the *Analysis Area* and even more limited within the *Planning Area*. The New Mexico Environment Department has several air quality monitoring stations within Doña Ana County. Specific air quality data for specific events within the Monument are not available.

Management Decisions with No Impacts to Air Quality: The following resources or uses have no or little impact on Air Quality: Paleontological Resources, Education and Interpretation, Soils, Cultural Resources, Lands with Wilderness Characteristics, Socio-Economic Conditions, Soils, Special Status Species, Special Designations, Visual Resources, Water Resources, and Wildlife.

Effects Common to All Alternatives:

Impacts from Vegetation – Managing and restoring the vegetation within the Monument could reduce soil erosion and thus reduce dust. However, using only passive means of vegetation restoration, as Alternative B states, would in most cases, take a much longer time to achieve the same or similar results as would active restoration projects.

IMPACTS OF THE ALTERNATIVES

4.4.5.1.1 ALTERNATIVE A

Impacts from Recreation and Visitor Services and Trails and Travel Management – Under Alternative A, motorized and mechanized vehicle use along approximately 37.6 miles of existing routes would result in localized dust and vehicle emissions. Most vehicle use would occur at low speeds in rough terrain along scoured canyon bottoms or across bedrock outcrops, which would not create measurable dust. Overall, air quality impacts from vehicle use would be minimal and short-term.

Impacts from Lands and Realty – Under Alternative A, land use authorizations that benefit the Monument would be considered, which may create ground disturbance and temporary impacts to air quality. Actions such as surface disturbing right-of-way construction could potentially impact air quality with short-term, localized degradation. Best management practices such as controlling erosion, minimizing surface disturbance, and using dust control measures would be implemented to reduce impacts to air quality. Under Alternative A, it is not proposed to acquire the 640 acres of subsurface acres that are not Federally-owned. This could potentially lead to development of the private minerals within the Monument, thus creating the possibility of air quality degradation from these mineral activities.

Impacts from Livestock Grazing – Under Alternative A, movement of the livestock across the 5,255 acres and use of the two-track routes by the livestock permittees may create dust when traversed, however the high rock content of the soil diminishes the opportunities for dust creation and this activity would have an adverse, but likely negligible impact on air quality.

Impacts from Wildland Fire Management – Although there are no fire management actions planned under Alternative A, in the case of an unplanned fire there would be short-term and temporary degradation to air quality during the fire. The extent of the emissions would depend on the fuel source and amount of area burning.

4.4.5.1.2 ALTERNATIVE B

Impacts from Recreation and Visitor Services – Under Alternative B, little or no measureable impacts to air quality are anticipated resulting from recreational visitor use. Prohibiting campfires would eliminate campfire smoke.

Impacts from Trails and Travel Management – Alternative B closes the Monument to all vehicle use and eliminates the opportunity for impacts on air quality resulting from vehicle emissions and localized dust.

Impacts from Lands and Realty – Under Alternative B, ground disturbing land use authorizations would not be permitted. Proposed in Alternative B is acquisition of the non-Federal, subsurface minerals totaling approximately 640 acres. By acquiring the subsurface minerals, it would remove the possibility of development of the private minerals within the Monument, thus eliminating the possibility of air quality degradation from these mineral activities.

Impacts from Livestock Grazing – Livestock use under Alternative B would not be allowed. This would reduce air quality impacts as compared to Alternative A. Cattle would not be disturbing the soil surface and vegetation quantities would be expected to increase; this would reduce dust emissions over the other alternatives.

Impacts from Wildland Fire Management – Under Alternative B, air quality impacts from possible wildland fire are the same as under Alternative A.

4.4.5.1.3 ALTERNATIVE C

Impacts from Recreation and Visitor Services – Under Alternative C, campfires would contribute to air pollutant emissions in the region. Dust would occur during construction of a visitor center or visitor facilities; however, the impacts would be temporary and limited to the time of construction.

Impacts from Trails and Travel Management – Under Alternative C, permitted motorized vehicle use along approximately 26.9 miles of existing routes would result in localized dust and vehicle emissions. Most vehicle use would occur at low speeds in rough terrain and along arroyos. Overall, air quality impacts from vehicle use would be minimal and short-term.

Impacts from Lands and Realty – Under Alternative C, limited land use authorizations that benefit the Monument would be considered, which may create ground disturbance and temporary impacts to air quality. This would be comparable to the air quality impacts discussed in Alternative A. Impacts from acquisition of the non-Federal minerals are the same as for Alternative B.

Impacts from Livestock Grazing – Livestock use under Alternative C is similar to Alternative A except that grazing is excluded from specific locations such as proposed campsites and certain areas to protect paleontological resources. This would likely move the minimal air quality impacts to other areas within the Monument, which would create the same impacts as Alternative A.

Impacts from Wildland Fire Management – Under Alternative C, air quality impacts from possible wildland fire are the same as Alternative A.

4.4.5.1.4 ALTERNATIVE D

Impacts from Recreation and Visitor Services – Under Alternative D, impacts from recreation and visitor services would be similar to Alternative C. Visitors to a visitor center would create more daily motorized traffic within the Monument. Emissions and dust from motorized traffic would increase with this Alternative as compared to Alternative A.

Impacts from Trails and Travel Management – Under Alternative D, impacts from trails and travel management would be similar to Alternative C. Motorized tour routes would create more daily motorized traffic within the Monument. Emissions and dust from motorized traffic would increase with this Alternative as compared to Alternative A.

Impacts from Lands and Realty – Under Alternative D, land use authorizations that benefit the Monument would be considered, which may create ground disturbance and temporary impacts to air quality. This would be comparable to the air quality impacts discussed under Alternatives A and C. Impacts from acquisition of the non-Federal minerals are the same as for Alternatives B and C.

Impacts from Livestock Grazing – Under Alternative D, impacts from livestock grazing on air quality would be similar to Alternative A.

Impacts from Wildland Fire Management – Under Alternative D, prescribed fire can be used as a management tool. Prescribed fire would impact air quality during the prescribed fire and after the prescribed fire until re-vegetation occurs that reduces windblown dust. The extent of the emissions would depend on the type and amount of fuel and size of fire. Air quality impacts would be minimized by using smoke management techniques.

4.4.5.2 CLIMATE

Assumptions and Incomplete Information: The assessment of greenhouse gas (GHG) emissions, their relationship to global climatic patterns, and the resulting impacts is an ongoing scientific process. The inconsistency in results of scientific models used to predict climate change at the global scale and the lack of scientific models capable of predicting climate change on regional or local scales, limit the ability to quantify potential future impacts of decisions made at this level. Determining the significance of any discrete amount of GHG emissions is beyond the limits of existing science. However, scientists are increasingly able to isolate likely scenarios for climate change and its impacts on a regional scale. The U.S. Global Change Research Program Report on Impacts of Climate Change in the United States (2009) focuses on broad areas of the country and greatest points of vulnerability as well as looking at Climate Change Impacts in different sectors of the economy. In the Southwest, a particular concern is the uncertainty around precipitation and the potential for extended periods of drought stressing already uncertain water supplies.

When further information on the impacts to climate change is known, such information would be incorporated into the BLM's planning and NEPA documents as appropriate.

Management Decisions with No Impacts to Climate: The following resources or uses have no or little impact on Climate: Paleontological Resources, Education and Interpretation, Cultural Resources, Lands and Realty, Lands with Wilderness Characteristics, Soils, Special Status Species, Special Designations, Visual Resources, Water Resources, and Wildlife.

Effects Common to All Alternatives:

The impacts of each of the alternatives would be the same as related to climate.

Impacts from Trails and Travel Management and Livestock Grazing – Livestock, humans, and vehicle emissions may contribute to climate change through the increase or decrease of greenhouse gas emissions, but it is uncertain as to what degree these activities can make a discernible impact on climate change within the 5,255 acres.

Impacts from Wildland Fire Management – If a wildfire or prescribed fire occurred, it would result in greenhouse gas emissions, but the subsequent new vegetation may make up for this in carbon sequestration over time.

4.4.6 CULTURAL RESOURCES

Assumptions and Incomplete Information: The BLM cultural resource management program has been developed to comply with Federal law, implementing regulations, and other policies which address cultural resources and historic preservation. Impact analysis assumes that the program would be implemented in accordance with BLM policy. The program consists of four elements: (1) inventory and evaluation, (2) protection and preservation, (3) cultural resource use allocation, and (4) planning.

The analysis assumes that BLM will continue the compliance aspect of the program by reviewing specific projects in accordance with Section 106 of the National Historic Preservation Act (NHPA). The BLM takes into account the potential effects on cultural resources that are eligible for the National Register of Historic Places (NRHP) and modifies proposed activities to avoid adverse effects to significant cultural resources, or reduces or mitigates adverse effects should avoidance not be possible.

Information about cultural resources within the PTNM is incomplete. No systematic, block inventory has been undertaken to identify and evaluate cultural resources. Class III inventory will be conducted in compliance with Section 106 of the NHPA as projects with the potential to adversely affect significant cultural resources are proposed.

Management Decisions with No Impacts to Cultural Resources: The following resources or uses have no or little impact on Cultural Resources: Education and Interpretation, Air Resources-Air Quality and Climate, Geology/Minerals, Lands with Wilderness Characteristics, Socio-Economic Conditions, Soils, Special Designations-Area of Critical Environmental Concern, Wilderness Study Area, Research Natural Area, Special Status Species, Visual Resources, and Wildlife.

Effects Common to All Alternatives: Where new ground disturbance is proposed, the BLM will comply with Section 106 of the NHPA to inventory and evaluate cultural resources, and either modify the project to avoid adverse effects to significant cultural resources eligible for the NRHP or reduce or mitigate adverse effects where avoidance is not possible.

IMPACTS OF THE ALTERNATIVES

4.4.6.1 ALTERNATIVE A

Impacts from Paleontological Resources – Casual collecting of fossils is allowed. While collecting fossils, there is potential for cultural resources to be inadvertently or intentionally vandalized or stolen.

Impacts from Recreation and Visitor Services – Under Alternative A, dispersed camping is allowed. The location of any dispersed camping site with the Monument could impact cultural resources when the surface is disturbed to create a camp, which could displace artifacts. Dispersed camp sites could be subject to compliance with Section 106 of the NHPA if these sites become popular and heavily used. Casual collecting of rock and mineral resources is allowed which may lead to cultural resources being inadvertently or intentionally vandalized or stolen.

Impacts from Trails and Travel Management – Under Alternative A, the location of any existing or new routes that could be maintained, improved, or developed would be subject to compliance under Section 106 of the NHPA in order to avoid adverse effects to cultural resources.

Impacts from Lands and Realty – Under Alternative A, any proposed land use authorizations that allow surface disturbing activities would be subject to compliance with Section 106 of the NHPA. Projects proposed where cultural properties are found would be adjusted by means of mitigating the effects such as redesigning the project or changing the location.

Impacts from Livestock Grazing – The location for any proposed range improvements with the potential for ground disturbance would be subject to compliance with Section 106 of the NHPA. Building, maintaining, or removing fences, water systems, or other range improvements would potentially impact cultural resources. However, projects proposed where cultural properties are found would be adjusted by means of mitigating the effects such as redesigning the project or changing the location.

4.4.6.2 ALTERNATIVE B

Impacts from Paleontological Resources – No collecting of common invertebrate fossils would be allowed, which would nearly eliminate inadvertent collection of artifacts.

Impacts from Recreation and Visitor Services – Visitation to the Monument would probably decrease under this Alternative. The opportunity to encounter cultural resources would be limited and impacts to cultural resources would probably be minor.

Impacts from Trails and Travel Management – Closing the Monument to motorized and mechanized travel would reduce the number of visitors to the Monument so opportunities for encountering cultural resources would be limited. Vandalism and theft of cultural resources would be reduced substantially compared to the other Alternatives.

Impacts from Lands and Realty – Under Alternative C, surface-disturbing land use authorizations would be approved, therefore minimizing impacts to cultural resources from these activities.

Impacts from Livestock Grazing – The Monument would be closed to livestock grazing in Alternative B, therefore there would be no impacts to cultural resources expected from this activity.

Impacts from Vegetation – The passive methods of vegetation management proposed in Alternative B would not disturb soils and are not expected to impact cultural resources.

4.4.6.3 ALTERNATIVE C

Impacts from Paleontological Resources – Impacts of Alternative C would be the same as those described in Alternative B.

Impacts from Recreation and Visitor Services – Under Alternative C, designated camping areas, a visitor contact station, and visitor facilities are proposed. In conjunction with BLM authorized interpretive or educational activities and programs, limited collecting of rock and mineral resources would be allowed, which would limit the potential for vandalism or looting of cultural resources. These activities would be conducted under the supervision of staff or trained docents and volunteers who can discern rocks and minerals from artifacts. The location of any proposed primitive campground, designated camping area, visitor contact station, or visitor facilities would be subject to compliance with Section 106 of the NHPA. The surface disturbance created by these proposed actions could potentially impact cultural resources. However, proposed projects where cultural properties are found would be adjusted by means of mitigating the effects such as redesigning the project or the changing the location.

Impacts from Trails and Travel Management – The location of any existing or new routes that could be maintained, improved, or developed would be subject to compliance under Section 106 of the NHPA in order to avoid adverse effects to cultural resources. Proposed projects where cultural properties are found would be adjusted to mitigate the effects such as redesigning the project or changing the location.

Impacts from Lands and Realty – Under Alternative C, impacts to cultural resources would be similar to those described under Alternative A and impacts stated in *Effects Common to All Alternatives*.

Impacts from Livestock Grazing – Impacts would be similar to those in Alternative A.

Impacts from Vegetation – Under Alternative C, manual removal of noxious weeds would be allowed, if necessary. The location for any proposed manual removal of noxious weeds and invasive species would be subject to compliance with Section 106 of the NHPA. The action that would allow the manual removal of noxious weeds and invasive species would be adjusted by means of mitigating the effects such as redesigning the project, so as to not create surface disturbance if cultural resources are found at the project site.

4.4.6.4 ALTERNATIVE D

Impacts from Paleontological Resources – Under Alternative D, collecting of common invertebrates in conjunction with a BLM authorized activity or program would be allowed but there is potential for cultural resources to be inadvertently or intentionally vandalized or stolen during this activity. This risk is less than Alternative A due to the activity being authorized and the collecting directed in a specific location supervised by individuals trained to discern fossils and minerals from artifacts.

Impacts from Recreation and Visitor Services – Pedestrian trails, kiosks and wayside exhibits, campgrounds, and a full service visitor center are proposed. Casual collecting of rock and mineral resources is allowed also. While collecting these resources, there is potential for cultural resources to be inadvertently or intentionally vandalized or stolen from the Monument. The location of any proposed visitor facility would be subject to compliance under Section 106 of the NHPA. The actions that would allow new pedestrian trails, kiosks, wayside exhibits, campgrounds, and a full visitor center could potentially impact cultural resources. However, the project proposed where cultural properties are found would be adjusted by means of mitigating the effects such as redesigning the project or changing location.

Impacts from Trails and Travel Management – Impacts to cultural resources would be the same as those described in Alternative C.

Impacts from Land and Realty – Under Alternative D, impacts to cultural resources would be similar to those described under Alternative A and impacts stated in *Effects Common to All Alternatives*.

Impacts from Livestock Grazing – Impacts to cultural resources would be the same to those described in Alternative A and Alternative C.

Impacts from Vegetation – Impacts would be the same to those in Alternative C.

Impacts from Wildland Fire Management – The location of any proposed prescribed fire and mechanical thinning would be subject to compliance under Section 106 of the NHPA. The action that would allow prescribed fire and mechanical thinning could potentially impact cultural resources. However, the proposed projects where cultural properties are found would be adjusted by means of mitigating the effects such as redesigning the project or changing the location.

4.4.7 LANDS AND REALTY

Assumptions and Incomplete Information: Any and all land use authorizations would include stipulations to avoid introducing noxious weeds into the Monument.

Management Decisions with No Impacts to Lands and Realty: The following resources or uses have no or little impact on Lands and Realty: Education and Interpretation, Trails and Travel Management, Air Resources, Cultural Resources, Livestock Grazing, Special Designations- Research Natural Area, Special Status Species, Vegetation Management, Wildland Fire Management, Wildlife.

Effects Common to All Alternatives:

Impacts from Lands and Realty – Under all Alternatives, BLM would continue to acquire legal public access easements for the PTNM. This would allow the BLM and public to have legal access into the PTNM.

Impacts from Special Designations -Area of Critical Environmental Concern – Under all Alternatives, rights-of-way are not authorized in the ACEC. These limitations on rights-of-way would reduce the number of acres available for rights-of-way in the Monument by about 789 acres.

IMPACTS OF THE ALTERNATIVES

4.4.7.1 ALTERNATIVE A

Impacts from Lands and Realty – Under Alternative A, the Monument legislation states that only those uses that benefit the Monument would be allowed. The private mineral estate located in the southern portion of the Monument would not be acquired, which could result in split-estate issues. This would be incompatible with management of the public land within the PTNM. Land use authorizations (both surface disturbing and non-surface disturbing) would be authorized on a case-by-case basis following NEPA analysis consistent with Monument goals and objectives.

4.4.7.2 ALTERNATIVE B

Impacts from Recreation and Visitor Services – Under Alternative B, there would be no management actions that would impact lands and realty.

Impacts from Lands and Realty – Under Alternative B, surface disturbing authorizations would not be authorized. Non-surface disturbing activities could be authorized. This would allow authorizations such as film permits in the Monument, which could be a benefit to the promotion of the resources and scientific research.

The BLM would attempt to acquire non-Federal minerals located in section 36, T. 23 S., R. 1 W., to reduce possible surface disturbance associated with mineral development which would be incompatible with management of the PTNM. As a result of acquiring the non-Federal minerals, the BLM would have jurisdiction over both the surface and subsurface.

Impacts from Lands with Wilderness Characteristics – Under Alternative B, approximately 576 acres of land within the Monument would be managed for wilderness characteristics. One of the management prescriptions is to manage this area as an exclusion area for rights-of-ways. This would eliminate those

576 acres from being available for rights-of-ways, but does not eliminate them from all land use authorizations. For example, film permits proposing no surface disturbance could be permitted under Alternative B. Although this limits the type of land use authorizations permitted within these 576 acres, it allows management of the area to be consistent with the goals and objectives of lands with wilderness characteristics.

Impacts from Soils – Under Alternative B, surface disturbing activities would not be authorized. Soil resources would not be altered or impaired.

Impacts from Visual Resources – Under Alternative B, the portion of the Monument outside of the special designation areas would be managed as VRM Class I (1,365 acres). The rest of the Monument would be managed as VRM Class II. In Alternative B, surface disturbing land use authorizations are not allowed, so there would be no impacts from visual resources on the Lands and Realty program.

4.4.7.3 ALTERNATIVE C

Impacts from Recreation and Visitor Services – Under Alternative C, impacts from the Recreation and Visitor Services program could include the need for authorizing rights-of-way (electricity, water, roads) to service the proposed visitor facilities.

Impacts from Lands and Realty – Under Alternative C, land use authorizations (both surface disturbing and non-surface disturbing) would be considered if consistent with Monument goals and objectives. Acquisition of access easements for public use would facilitate public and administrative access.

Impacts from acquiring the 640 acres of non-Federal mineral estate within and adjacent to the Monument in section 36, T. 23 S., R. 1 W., are the same as Alternative B.

Impacts from Lands with Wilderness Characteristics – Under Alternative C, approximately 253 acres of land within the Monument would be managed for wilderness characteristics and rights-of-way would be excluded. Film permits proposing no surface disturbance would be considered as would other non-surface disturbing activities. Although this limits the types of land use authorizations permitted within these 253 acres, it allows management of the area to be consistent with the goals and objectives of lands with wilderness characteristics.

Impacts from Visual Resources – Under Alternative C, the area designated as the Robledo Mountains WSA and ACEC, and the lands with wilderness characteristics would be managed as VRM Class I (1,042 acres) by preserving the existing character of the landscape and allowing impacts to the landscape to have little or no change to the visual environment. The rest of the Monument would be managed as VRM Class II by retaining the existing character of the landscape and allowing the level of change to the landscape to be low and not attract attention of the casual observer. Prior to construction of any visitor facilities, an activity and site development would be completed, which would explore opportunities of appropriate locations for facilities and would follow the Visual Resource Management Objectives. Therefore, authorizations would be designed as to not impair these visual qualities.

Impacts from Soils – Under Alternative C, realty actions such as right-of-way or land use authorization would be allowed. Rights-of-way could cause adverse impacts to soils from surface disturbances. Each lands and realty action would require mitigation on a case-by-case basis due to varying impacts associated with action type, size, and location.

4.4.7.4 ALTERNATIVE D

Impacts from Recreation and Visitor Services – The impacts are the same as under Alternative C.

Impacts from Lands and Realty – The impacts are the same as under Alternative C.

Impacts from Lands with Wilderness Characteristics – Under Alternative D, lands found to have wilderness characteristics would not be managed for their wilderness characteristics. Rights-of-way, access, and other land use authorizations would not be constrained by managing for wilderness characteristics.

Impacts from Visual Resources – Under Alternative D, the area designated as the Robledo Mountains WSA and ACEC would be managed as VRM Class I (789 acres). The rest of the Monument would be managed as VRM Class II. These impacts are the same as for Alternative C.

Impacts from Soils – Under Alternative D, the impacts are the same as those stated in Alternatives A and C.

4.4.8 LANDS WITH WILDERNESS CHARACTERISTICS

Assumptions and Incomplete Information: Wilderness characteristic values include the area's size, its naturalness, and outstanding opportunities for solitude or a primitive and unconfined recreation. They may also include supplemental values. Lands with wilderness characteristics are those lands that have been inventoried and determined by the BLM to contain wilderness characteristics as defined in section 2(c) of the Wilderness Act (Public Law 88-577). In 2011, the wilderness inventory was updated for the Monument. This inventory identified 576 acres of land contiguous to the Robledo Mountains WSA within the Monument as having wilderness characteristics.

Management Decisions with No Impacts to Lands with Wilderness Characteristics: The following resources or uses have little or no impact on those Lands with Wilderness Characteristics: Air Resources, Cultural Resources, Grazing, Special Status Species, Visual Resources, Vegetation, Water Resources, and Wildlife.

IMPACTS OF THE ALTERNATIVES

4.4.8.1 ALTERNATIVE A

Under Alternative A, 576 acres are identified as having wilderness characteristics, but are not protected from actions that would diminish those characteristics. However, there are no activities planned under Alternative A for those 576 acres that would impact the wilderness characteristics of these lands.

4.4.8.2 ALTERNATIVE B

Under Alternative B, approximately 576 acres would be protected for wilderness characteristics. There are no resource management actions that would cause impacts that would detract from the wilderness characteristics of these 576 acres. All resource management actions stated under Alternative B would be complementary to protecting wilderness characteristics.

4.4.8.3 ALTERNATIVE C

Under Alternative C, approximately 253 acres would be identified and protected as lands with wilderness characteristics. Approximately 323 acres of land identified during the 2011 inventory would not be managed to protect wilderness characteristics. There are no planned resource management actions that would cause impacts that would detract from the wilderness characteristics of the 253 acres.

Impacts from Paleontological Resources - Under Alternative C, approximately 323 acres of lands with wilderness characteristics would not be managed for wilderness characteristics and could be utilized for paleontology studies and excavations.

Impacts from Education and Interpretation – Under Alternative C, development of a hiking trail system with kiosks would occur. In order to interpret the *Discovery Site* properly, a trail and signage would be necessary on the land not protected for its wilderness characteristics. The human impacts on the 323 acres may be noticeable.

Impacts from Recreation and Visitor Services – Under Alternative C, designated camping areas, hiking trails, visitor contact station, and visitor facilities are proposed. These recreational trails and

facilities could be placed on the 323 acres outside of the protected lands with wilderness characteristics. However, doing so may potentially impact wilderness characteristics in those areas.

Impacts from Trails and Travel Management – Under Alternative C, new routes and trails could be constructed and existing routes could be maintained or improved. This alternative would allow for a trail to be constructed or maintained to the *Discovery Site*, which is the boundary for those acres managed as lands with wilderness characteristics. Alternative C allows for man-made intrusions on the area outside of the protected 253 acres.

Impacts from Lands and Realty – Under Alternative C, surface disturbing land use would be authorized on those lands not protected for wilderness characteristics following NEPA analysis. Surface disturbing land use authorizations may impact the wilderness characteristics

4.4.8.4 ALTERNATIVE D

Under Alternative D, lands with wilderness characteristics would not be managed to protect those wilderness characteristics, and therefore the wilderness characteristics may be impacted.

Impacts from Paleontological Resources – The 576 acres not protected for wilderness characteristics could be utilized as appropriate areas for paleontological research, interpretation and other activities.

Impacts from Education and Interpretation – Under Alternative D, the impacts are the same as Alternative C except the proposed actions may impact 576 acres not protected for wilderness characteristics.

Impacts from Recreation and Visitor Services – Under Alternative D, the impacts are the same as Alternative C except the proposed actions may impact 576 acres not protected for wilderness characteristics.

Impacts from Trails and Travel Management – Under Alternative D, the impacts are the same as Alternative C except the impacts may occur on 576 acres not protected for wilderness characteristics.

Impacts from Lands and Realty – Under Alternative D, the impacts are the same as Alternative C except surface disturbing activities may occur and impact 576 acres not protected for wilderness characteristics.

4.4.9 LIVESTOCK GRAZING

Assumptions and Incomplete Information: It is assumed that visitation to the PTNM would increase over time.

Management Decisions with No Impacts to Livestock Grazing: The following resources or uses have no or little impact on Livestock Grazing: Paleontological Resources, Education and Interpretation, Air Resources, Cultural Resources, Lands and Realty, Soils, Special Designations- Research Natural Area, Special Status Species, Visual Resources, Water Resources, and Wildlife.

Effects Common to All Alternatives:

Impacts from Special Designations-WSA – Under all Alternatives, the continued management of the ACEC designation would limit the construction of new range improvements such as fences, watering facilities, pipelines, and erosion control structures. This could limit the ability to change the management of the area such as creating new pastures for rest-rotation grazing.

Impacts from Wildland Fire Management – Under all Alternatives, improvements would be protected from all fire by preplanned defendable space and fire suppression tactics as needed. Even though, these precautions would be taken, wildfires could damage or destroy range improvements such as watering facilities and fences, and could result in injury or death of livestock. In the event of a wildland fire, grazing deferment would potentially occur, which would impact livestock operations. Livestock would have to be removed from the burned area; the grazing permittees would then have to find another location for the livestock or reduce their number of livestock until the grazing deferment is complete.

IMPACTS OF THE ALTERNATIVES

4.4.9.1 ALTERNATIVE A

Impacts from Recreation and Visitor Services – Under Alternative A, visitor facilities would be minimal. With the designation of the Monument, it is assumed that the number of visitors would increase and increased recreational use by visitors could result in conflicts with livestock and allotment management goals. Visitors congregating around livestock waters would directly conflict with livestock watering needs. Vandalism, carelessness or abuse by visitors could result in damage to range improvements including fences, watering facilities, and pipelines, which would in turn interfere with the proper management of livestock.

Impacts from Trails and Travel Management – The designated routes would continue to exist for motorized, mechanized, and pedestrian travel and their use is expected to increase. This may lead to a potential increase in collisions with vehicles resulting in associated property damage and injury to visitors or livestock. Livestock operators would be permitted to use motorized vehicles on designated routes. This would allow for the operators to maintain range improvements and care for livestock with motorized vehicles, on foot, or horseback.

Impacts from Livestock Grazing – Under Alternative A, grazing would continue on both the Picacho Peak and Altamira Ranch Allotments. Range improvements would continue to exist on the Picacho Peak Allotment, which are authorized under Section 4 range improvement permits and cooperative agreements. Range improvement permits grant title and maintenance responsibility to the grazing permittee, while cooperative agreements provide shared title between the permittee and BLM. The goal of improvements

to the range infrastructure would be to improve distribution of cattle, promote rangeland health, and maintain or enhance forage production. The authorization of future range improvements would be prioritized based on a cost-benefit analysis. The continued maintenance and functionality of these improvements is important to maintain an even distribution of the grazing pressure associated with cattle grazing and provide water sources for wildlife.

Impacts from Lands with Wilderness Characteristics – Under Alternative A, there are no designated lands with wilderness characteristics, so there are no impacts to livestock grazing.

Impacts from Vegetation – Under Alternative A, chemical herbicides could be used to control noxious weeds. Introduced exotic and native weeds would compete with desired native plant species for water and nutrients if not controlled. It is probable that continued shrub encroachment would result in further competition for water and nutrients with perennial forage species. Increased competition for resources could ultimately lead to reductions in grass cover and forage available for livestock use.

4.4.9.2 ALTERNATIVE B

Impacts from Livestock Grazing – Under Alternative B, The BLM would not authorize livestock to graze in the PTNM. This alternative would require that the grazing permittees for the Picacho Peak and Altamira allotments control their cattle so that they do not graze within the Monument. In the absence of fence, this would entail active herding by the permittees in addition to shutting off the water that is piped to the troughs located within the PTNM. If the BLM in conjunction with grazing permittees constructed a Monument boundary fence in lieu of active herding and water control, this would exclude livestock from the Monument and leave the surrounding public lands available to livestock. Management guidelines for the Robledo Mountains WSA would create challenges for fencing the Monument boundary for those areas inside the WSA. If fence construction was selected as the tool to exclude livestock from the Monument, minor fence reroutes of the pasture fence dividing the north and south pastures of the Picacho Peak Allotment would be necessary to fully exclude approximately 150 acres in the southern part of the Monument from the remainder of the allotment. Additional fence might also be needed to define the Monument boundary. The perimeter of the PTNM is approximately 14.5 miles in length. Of this length, approximately 0.75 miles of existing fence parallels the Monument boundary. Approximately 1.3 miles of pasture fence would need removal or need to be rerouted. In total, approximately 13.75 miles of fence would need to be constructed to define the entire Monument boundary, and ensure grazing from the surrounding allotments would be excluded. Assuming an estimate of \$3.20 per foot on construction of a wire fence in rough terrain (from the 2011 practice cost data from the Natural Resources Conservation Service [NRCS 2011]), excluding livestock grazing from the Monument through use of fencing would cost approximately \$232,320 to be incurred by the BLM or the BLM and permittee(s).

Overall, exclusion of grazing in the Monument would result in the need to adjust allotment boundaries of the two allotments within the Monument. Removing livestock grazing from the Monument would eliminate approximately 4,505 acres from the north pasture on the Picacho Peak Allotment; without changes to allotment infrastructure, this would make the north pasture virtually unusable since the remaining parcels would be very small and would be separated by the Monument. Ultimately, since there is only one other pasture that is actively used on the allotment, this would result in decreased flexibility for the grazing permittee, removing the ability to defer areas from grazing without additional changes to the allotment infrastructure. Also, reductions to the number of cattle that could responsibly graze on the allotment would need to be made from the reduced acreage on the allotment, having a direct economic impact on the livestock operations for the grazing permittee. There would be a decrease in carrying capacity of 395 AUMs or 33 cattle yearlong for the Picacho Peak Allotment. In addition, nearly all of the livestock watering points and pipelines in the north pasture of the Picacho Peak Allotment are within the

Monument boundary. The majority of range improvement projects in the Monument are currently authorized under range improvement permits that grant title and maintenance responsibility to the grazing permittee. The Robledo Interior Fence and the Robledo Pipeline are authorized under cooperative agreements, where title is shared between the contributing grazing permittee and the BLM, and maintenance responsibility belongs to the grazing permittee. If grazing were discontinued within the Monument, the United States would be required to compensate the permittee for their share of the value of the range improvements in accordance with the grazing regulations (43 CFR 4120.3-6). The permittee may be allowed to remove the range improvements authorized under a range improvement permit, which would include salvaging materials and performing site rehabilitation where needed as a result of ground disturbance from removing these improvements.

Exclusion of livestock from the Monument would have less impact on current management trends for the Altamira Allotment. There would be a loss of approximately 748 acres available to grazing, which would result in reductions to the allotment carrying capacity. The loss of these acres would equate to a decrease in carrying capacity of approximately 61 AUMs or 5 cattle yearlong on the Altamira Allotment. This would result in direct financial impacts to the grazing permittee from the loss of forage.

No range improvement projects are authorized on the Altamira Allotment within the Monument boundary. Much of the Altamira Allotment lies within the Robledo Mountains WSA, where ground disturbing activities are largely prohibited. Should the permittee decide to plan livestock water to increase the ability of livestock to make use of forage in the southern part of this allotment, the Wilderness Study Area would reduce the amount of land available for construction of new improvements in the Monument approximately by half.

4.4.9.3 ALTERNATIVE C

Impacts from Recreation and Visitor Services – Visitor facilities would expand and grazing may be excluded from these sites resulting in minor decreases in acreage available for forage. Projects that involve reducing the acreage available to grazing would be individually analyzed for site-specific impacts to livestock grazing and if applicable, changes to carrying capacity.

Impacts from Trails and Travel Management – Under Alternative C, improvement of designated routes or construction of new routes could increase motorized use of the Monument, which would result in the increase for potential conflicts between livestock and motorized vehicle users. More interaction between livestock and humans or vehicles increases the chances of livestock and visitors getting hurt or livestock improvements getting damaged. Livestock operators would be permitted to use motorized vehicles on designated routes. This would allow for the operators to maintain range improvements and care for livestock with motorized vehicles, on foot, or horseback.

Impacts from Livestock Grazing – Under Alternative C, adjustments could be made to the allotment management plan in consultation with the grazing permittee to aid in management of the Monument. Adjustments to allotment management would be necessary if exclusion areas were created in order to minimize contact between livestock and recreational areas that would see heavy use by Monument visitors; these adjustments to the allotment management plan would be needed if changes were warranted in season of use, prescribed grazing systems, or livestock numbers as a result of creating exclusion areas that alter grazing patterns. Range improvements would be authorized in a manner consistent with Alternative A in order to promote rangeland health and maintain or enhance forage production. Improvements would be designed to enhance Monument management objectives and minimize potential conflicts with other resources and uses.

Impacts from Lands with Wilderness Characteristics – Under Alternative C, approximately 253 acres would be managed for wilderness characteristics. Within these 253 acres, surface disturbing range improvements and motorized and mechanized vehicle use would not be allowed.

Impacts from Vegetation – Under Alternative C, integrated management techniques including passive, manual, biological, chemical, and mechanical treatment methods to manage noxious weeds and non-native invasive species would be used. This would limit the competition between noxious weeds or non-native invasive species with desired forage thus increasing desired forage for livestock. Particular sites within the Monument would be managed for multiple-use values while maintaining or enhancing habitat for special status species.

4.4.9.4 ALTERNATIVE D

Impacts from Recreation and Visitor Services – Impacts to livestock grazing from Recreation and Visitor Services under this Alternative would be the same as those described under Alternative C.

Impacts from Trails and Travel Management – Impacts to livestock grazing from Trails and Travel Management under this Alternative would be the same as those described under Alternative C.

Impacts from Livestock Grazing – Under Alternative D, effects of livestock management would be the same as those described in Alternative A.

Impacts from Lands with Wilderness Characteristics – Under Alternative D, impacts to livestock grazing from lands with wilderness characteristics are the same as described under Alternative A.

Impacts from Vegetation – Under Alternative D, integrated management techniques including passive, manual, fire, biological, chemical, and mechanical treatment methods to manage noxious weeds and non-native invasive species would be used. This would limit the competition between noxious weeds or non-native invasive species with desired forage thus increasing desired forage for livestock. Particular sites within the Monument would be managed for emphasizing commodity uses while maintaining or enhancing habitat for special status species.

Impacts from Wildland Fire Management – Under Alternative D, fire could be used as a vegetation management tool. Grazing deferments would be necessary to accumulate fine fuels in preparation of a prescribed fire, and also following a fire to help protect vegetation and soil stability afterward. Grazing deferments would impact typical livestock operations on the Picacho Peak Allotment by reducing flexibility in pasture rotation since there are only two active pastures on the Allotment. Any deferments in the north pasture for fire treatments to manage the Monument would either result in rotating livestock into the south pasture or moving them to privately-owned or leased lands elsewhere for the duration of the required deferment period. Any additional livestock use in the south pasture would result in increases to grazing pressure on vegetation, particularly around water sources.

4.4.10 SOCIO-ECONOMIC CONDITIONS

Data Sources:

Economic effects were modeled using IMPLAN Professional Version 3.0 and the Forest Economic Analysis Spreadsheet Tool (FEAST), with 2009 data. Data on use levels under each alternative were collected from the PTNM's resource specialists. In most instances, the precise change is unknown. Therefore, the changes are based on the professional expertise of the resource specialists.

A financial efficiency analysis is conducted for the Livestock Grazing and Recreation and Visitor Services programs. A financial efficiency analysis compares costs (expenditures) and benefits (revenues) over time. Costs and benefits that accrue in future years are adjusted using a 4 percent discount rate. This analysis does not account for all costs and benefits associated with public land management. The public value of recreating at a fee-free site, for instance, is not captured in this analysis. Non-monetary costs and benefits are described qualitatively in the social analysis.

Social effects use the baseline social conditions presented in the Affected Environment Section, visitor information from the Recreation Section of this analysis, and information from the Community Socioeconomic Workshops (Preister 2003) to discern the primary values that the Monument provides to area residents and visitors. Social effects are based on the interaction of the identified values with estimated changes to resource availability and uses. The social analysis addresses effects to non-market values, consistent with IM 2013-131 (BLM 2013).

Assumptions and Incomplete Information:

1. The economic impact of grazing was estimated using authorized levels. However, actual livestock use occurring within the Monument varies annually based on a number of factors, such as current forage and market conditions. The impact of recent management trends are reported.
2. Changes in use levels were estimated using professional judgment. However, precise changes in use are not possible to predict.
3. Some of the value of public land management is not captured in market transactions. Non-market goods and services, such as clean air and scenic vistas, have economic values. However, the monetary values of such goods and services are generally unknown. As a result, it is difficult to analyze potential tradeoffs between market and non-market values.
4. Data on the distribution of visitors among expenditure segment shares (i.e., local and non-local; overnight and day) is unavailable for the Monument. Therefore, segment shares from the Lincoln National Forest are applied to the total Monument visitation estimates. The economic impact analysis uses National data on average visitor spending by segment share on National Forests, since no equivalent data exist for BLM-managed land.
5. Organized OHV events affected by route closures would continue to take place on adjacent or nearby public lands.
6. It is assumed that visitors to the Monument for the purpose of recreation and scientific research would steadily increase over the life of the Plan, regardless of the chosen alternative.
7. The Community Socioeconomic Workshop report (Preister 2003) identifies a number of values related to public land in Doña Ana County, including: (a) public land access, (b) diverse and plentiful recreation opportunities, (c) ecological health, (d) preservation of traditional and cultural uses of public land, (e) community and economic development. These are assumed to be the key social values related to public land management in the *Analysis Area*.

Management Decisions with No Impacts to Social and Economic Conditions: Under all Alternatives, the following programs would have little or no impact to Socio-Economic Conditions: Air Resources, Cultural Resources, Lands and Realty, Soils, Special Status Species, Vegetation Management, Water Resources, and Wildlife.

Effects Common to All Alternatives:

Impacts to Environmental Justice – The majority (65.7 percent) of residents in Doña Ana County identify as Hispanic or Latino (U.S. Census Bureau 2010). The County also has a high incidence of poverty, with approximately one-quarter of residents living in poverty. However, an analysis of the decisions to be made under the Alternatives did not identify environmental justice consequences. None of the decisions are expected to disproportionately or adversely affect environmental justice communities.

Consequences to social values are analyzed within the Alternatives. Although quality of life associated with Monument uses may vary between Alternatives, none of these changes are expected to disproportionately affect Hispanic and Latino residents.

American Indian uses and traditional cultural practices will not be affected by any planning decisions.

IMPACTS OF THE ALTERNATIVES

4.4.10.1 ALTERNATIVE A

Impacts from Paleontological Resources and Scientific Values – The unique paleontological resources of the Monument drive much of the visitation. The economic impact of visitor spending is captured in the impacts from the Recreation and Visitor Services discussion, below. In addition to the contribution of paleontological resources to local economic activity, these resources provide social and non-market values. Degradation of fossils is expected to occur under Alternative A due to motorized use and casual collection. This loss of resources would reduce non-market values related to education and scientific discovery.

Impacts from Education and Interpretation – Under Alternative A, most of the interpretation and education related to the Monument would continue to occur off-site. Minimal signage and on-site interpretive opportunities are less likely to support values related to education. As a result, non-market values related to the preservation and dissemination of scientific knowledge are expected to be lower under Alternative A, relative to the other Alternatives.

Impacts from Recreation and Visitor Services – An estimated 25,000 people (10,000 party-trips) would visit the Monument each year under Alternative A. Visitor spending would support approximately 16 jobs and \$417,000 in labor income in the local economy on an average annual basis. Most of the employment and income would occur in the accommodation and food services sector.

Management of the recreation program in the Monument costs approximately \$135,000 annually. The Monument collects no visitor fees and recreation-related revenue is limited to cost-recovery of approximately \$4,500 associated with one special recreation permit, which is issued annually. Over the 20-year life of the Plan, using a 4 percent discount rate, the present net value of the recreation program on the Monument is -\$1,843,760. This analysis only considers financial costs and benefits accruing to the agency. The employment and income associated with these expenditures is captured in the impacts from the BLM expenditures analysis, below.

Impacts from Trails and Travel Management – Under Alternative A, non-permitted and permitted use by motorized and mechanized vehicles would continue on approximately 37.6 miles of trails and routes previously designated. Alternative A offers the most miles of trails and routes among the considered Alternatives. Residents and visitors who hold social values related to public land access and OHV recreation would benefit from Alternative A. However, a number of comments in the Preister (2003) report expressed concern that motorized and mechanized recreation on public land disturbs ecological health and reduces the quality of the recreation experience for non-motorized users.

More opportunities for motorized and mechanized recreation may make the Monument more attractive to some individuals and less attractive to others. Visitation to the Monument from all types of recreation users contributes to economic activity in the local area. The economic consequences of trail and travel management are captured in the impacts from the Recreation and Visitor Services analysis, above.

Impacts from Livestock Grazing – Alternative A would continue current livestock grazing management, with 456 permitted AUMs within the Monument boundary. However, the current stocking rate is considerably less. With over 1.5 million cattle and calves in New Mexico, the AUMs on the PTNM account for a very small portion of the livestock farming and ranching sector in the State (NASS 2011). As a result, less than one job and between \$6,000 and \$11,000 (depending on stocking rate) in labor income would be supported by grazing on the Monument, annually.

Management of the grazing program in the Monument costs approximately \$18,000 annually. Fees for the grazing that occur on the Monument total approximately \$615 annually. Over the 20-year life of the Plan, using a 4 percent discount rate, the present net value of the grazing program on the Monument is -\$245,180. This analysis only considers financial costs and benefits accruing to the agency. The employment and income associated with these expenditures is captured in the impacts from the BLM expenditures analysis, below.

Impacts from Lands with Wilderness Characteristics – Under Alternative A, no lands with wilderness characteristics are being managed within the Monument. As described in the Trails and Travel Management section above, Alternative A is expected to provide the highest value for individuals who prefer to maximize access to the public land and minimize restrictions on use. However, individuals who value the protection of cultural and paleontological resources, outstanding opportunities for solitude, and the protection of ecological integrity would be less likely to benefit from management under Alternative A.

Impacts from BLM Expenditures – Salary and non-salary (e.g., equipment) expenditures related to Monument management support approximately 5 jobs and \$287,000 in labor income in the local economy, annually.

Payments from the Monument to states and counties (e.g., PILT) total approximately \$13,000. These payments contribute to State and local budgets. Due to the relatively small size of these payments, less than one job and approximately \$8,000 in labor income would be supported in the local economy, annually.

4.4.10.2 ALTERNATIVE B

Impacts from Paleontological Resources and Scientific Values -- Alternative B would only permit the collection of paleontological resources in connection with authorized scientific research on the Monument. As a result, Alternative B is expected to reduce the loss of scientific information associated with fossils. The elimination of motorized and mechanized recreation and grazing on the Monument would also reduce fossil degradation. While these limits would promote non-market values related to

protection of sensitive resources and promotion of scientific inquiry, they may reduce other non-market values. For instance, the elimination of motorized and mechanized access may reduce the number of individuals who are able to observe and enjoy the paleontological resources of the Monument.

Impacts from Education and Interpretation—Similar to Alternative A, most of the education and interpretive activities related to the Monument would occur off-site. The elimination of casual fossil collection may reduce the quality of the experience for some individuals who value a tangible reminder of their experience. However, this decrease in value is expected to be more than offset by the educational and enjoyment value of protecting the Monument's resources for present and future generations.

Impacts from Recreation and Visitor Services—Due to the elimination of motorized and mechanized recreation opportunities under Alternative B, visitation is expected to be reduced to 5,625 annual visitors (2,250 party-trips). Visitor spending would support approximately 4 jobs and \$94,000 in labor income in the local economy on an average annual basis. Most of the employment and income would occur in the accommodation and food services sector.

Recreation-related program expenditures would continue to be approximately \$135,000 annually. The elimination of motorized recreation would eliminate recreation-related revenue. Therefore, over the 20-year life of the Plan, using a 4 percent discount rate, the present net value of the recreation program on the Monument is -\$1,908,080. This analysis only considers financial costs and benefits accruing to the agency. The employment and income associated with these expenditures is captured in the impacts from the BLM expenditures analysis below.

Impacts from Trails and Travel Management – Under Alternative B, the Monument would be closed to all motorized and mechanized use except administrative and emergency motorized use. Alternative B offers the fewest miles of roads and trails open to motorized and mechanized use. The closure of the Monument to all recreational motorized and mechanized uses would reduce quality of life for individuals who primarily value public land access and OHV recreation opportunities. The selection of Alternative B would make the Monument a less attractive recreation destination for motorized and mechanized recreationists. As a result, some individuals would likely choose to recreate elsewhere or stay home. This would reduce the economic impact of recreation on the public land in the local economy. However, since a number of individuals stated that motorized recreation reduced the quality of their experiences of public land (Preister 2003), the elimination of motorized and mechanized recreation on the Monument may make it a more attractive destination for non-motorized uses. The net economic impact of recreation is described in the impacts from recreation and visitor services analysis, above.

Impacts from Livestock Grazing – Alternative B would eliminate livestock grazing on the Monument. No grazing-related employment or labor income would be supported by activities on the Monument. The economic effect of this change would be very minor in the context of the local economy; there would be social consequences. The ranchers who use the Picacho Peak and Altamira Ranch Allotments would need to replace the lost forage. Since private forage is more costly than public land forage, the ranchers' operating costs would increase (NASS 2011). In addition, some individuals associate public land grazing with cultural and heritage values. The loss of grazing opportunities on public land, therefore, would reduce the quality of life for individuals who hold such values. Some individuals prefer the elimination of grazing and other commercial activities on public land. Individuals with these values would prefer Alternative B.

Impacts from Lands with Wilderness Characteristics – Alternative B would manage 576 acres (11 percent) of the Monument for wilderness characteristics. Alternative B would manage the highest proportion of the Monument for wilderness characteristics among the considered Alternatives. Therefore, Alternative B would be most likely to increase non-market economic values. Alternative B would appeal

to individuals who are primarily concerned with protecting wilderness characteristics and having outstanding opportunities for solitude and/or primitive and confined recreation.

Impacts from BLM Expenditures – Salary and non-salary (e.g., equipment) expenditures related to Monument management support approximately 5 jobs and \$287,000 in labor income in the local economy, annually.

Payments from the Monument to states and counties (e.g., PILT) total approximately \$13,000. These payments contribute to State and local budgets. Due to the relatively small size of these payments, less than one job and approximately \$8,000 in labor income would be supported in the local economy, annually.

4.4.10.3 ALTERNATIVE C

Impacts from Paleontological Resources and Scientific Values – The development of a visitor contact station under Alternative C would increase public understanding and appreciation of the paleontological resources of the Monument. This is expected to increase non-market values related to education, as more people are exposed to the Monument's unique resources. However, increased visitation may also increase the risk of theft and vandalism, which would reduce values related to the protection of sensitive resources and opportunities for scientific inquiry.

Impacts from Education and Interpretation – Alternative C would develop more educational and interpretive opportunities on-site, relative to Alternatives A and B. The economic effect of these actions, along with other management actions meant to improve the quality of the visitor experience, is captured in the impacts from Recreation and Visitor Services analysis below. Increased educational opportunities may also promote non-market values related to the dissemination of production of scientific knowledge. Furthermore, more interpretive opportunities may increase appreciation of the resources, and therefore, both increase social values related to the unique resources of the Monument and limit the risk of theft and vandalism, discussed above.

Impacts from Recreation and Visitor Services – A visitor contact station would be developed under Alternative C. Annual visitation is expected to increase to 37,500 people (15,000 party-trips) under Alternative C. Visitor spending would support approximately 24 jobs and \$626,000 in labor income in the local economy on an average annual basis. Most of the employment and income would occur in the accommodation and food services sector.

The expected cost for the station is outlined in the Recreation and Visitor Services Section (Section 4.4.3). During site construction, approximately 2.4 jobs and \$91,750 in labor income would be contributed to the local economy. The visitor contact station would not require additional staffing, therefore, no additional jobs would be supported during the operations and maintenance phase. Periodic road and site maintenance would contribute to the local economy; however, expected expenditures are minimal.

Recreation-related program expenditures would increase during the construction of the visitor contact station. Therefore, over the 20-year life of the Plan, using a 4 percent discount rate, the present net value of the recreation program on the Monument is -\$2,061,260. This analysis only considers financial costs and benefits accruing to the agency. The employment and income associated with these expenditures is captured in the impacts from BLM expenditures analysis, below and the construction impacts, above.

Impacts from Trails and Travel Management – Under Alternative C, Tabasco Twister Trail (2.7 miles) and Patzcuaro’s Revenge Trail (1.8 miles) would be closed to motorized and mechanized vehicle use. One un-named route from the intersection of Cayenne Crawler and Pasado to Sandia Gulch would be closed (0.5 mile). Cayenne Crawler Trail (0.4 mile) would be closed to motorized and mechanized use to eliminate access from the south to Patzcuaro’s Revenge Trail. Alternative C would leave the majority of the designated routes and trails available under Alternative A open to motorized and mechanized uses. The popularity of Tabasco Twister and Patzcuaro’s Revenge trails may discourage some visitation to the Monument from off-highway vehicle users. However, the reduction in visitor spending associated with this change is expected to be more than offset by increased visitation due to the development of a visitor contact station, as described in the impacts from Recreation and Visitor Services analysis. The economic consequences of visitor spending associated with trails and travel management are captured in the impacts from Recreation and Visitor Services portion of this analysis, above.

In social terms, Alternative C would balance some of the conflicting interests related to public land management. Specifically, Alternative C would continue to support public land access and diverse recreation opportunities while also reducing damage to natural and cultural resources. Nevertheless, individuals who use the Monument chiefly for motorized and mechanized use may have their values compromised, relative to current conditions.

Impacts from Livestock Grazing – Alternative C would continue to permit cattle grazing. Although, as with Alternative A, actual use may be expected to be lower depending on forage and market conditions. With over 1.5 million cattle and calves in New Mexico, the AUMs on the PTNM make up a very small portion of the livestock farming and ranching sector in the State (NASS 2011). As a result, less than one job and between \$6,000 and \$11,000 (depending on stocking rate) in labor income would be supported, annually.

The present net value of the grazing program would be the same as described under Alternative A.

Impacts from Lands with Wilderness Characteristics – Alternative C would manage 253 acres (5 percent) of the Monument for wilderness characteristics. Alternative C would manage the second-highest proportion of the Monument for wilderness characteristics among the considered Alternatives. This Alternative would balance the interests of individuals who value ecological preservation of the public land with the interests of individuals who primarily value access and motorized recreation opportunities. Alternative C would increase non-market economic values related to ecological health relative to Alternatives A and D.

Impacts from BLM Expenditures – Salary and non-salary (e.g., equipment) expenditures related to Monument management support approximately 5 jobs and \$287,000 in labor income in the local economy, annually. The construction and maintenance of the visitor contact station is excluded from these estimates, since these effects are captured in the impacts from the Recreation and Visitor Services analysis, above.

Payments from the Monument to states and counties (e.g., PILT) total approximately \$13,000. These payments contribute to State and local budgets. Due to the relatively small size of these payments, less than one job and approximately \$8,000 in labor income would be supported in the local economy, annually.

4.4.10.4 ALTERNATIVE D

Impacts from Paleontological Resources and Scientific Values – The social and economic consequences of paleontological resources are expected to be similar to those described under Alternative

C. The development of a visitor center would drive additional use to the Monument, which is analyzed in the impacts from the Recreation and Visitor Services section, below.

Impacts from Education and Interpretation – The social and economic consequences of interpretation and education are expected to be similar to those described under Alternative C. The development of a visitor center would provide more opportunities for education and interpretation on-site, which may increase social and non-market values as more people are exposed to the unique resources of the Monument.

Impacts from Recreation and Visitor Services – A visitor center would be developed under Alternative D. Annual visitation is expected to increase to 75,000 people (30,000 party-trips) under Alternative D. Visitor spending would support approximately 47 jobs and \$1,251,000 in labor income in the local economy on an average annual basis. Most of the employment and income would occur in the accommodation and food services sector. The expected cost for the center is outlined in the Recreation and Visitor Services Section (Section 4.4.3).

The expected cost for the center is outlined in the Recreation and Visitor Services Section (Section 4.4.3). During the construction phase, approximately 22 jobs and \$830,300 in labor income would be contributed to the local economy. Throughout operations and maintenance of the facility, additional staff would be required to manage the visitor center. Staffing of the visitor center would support slightly more than one job and \$33,000 in labor income in the local economy, annually.

Recreation-related program expenditures would increase due to the construction of the visitor center and the need for staff. Over the 20-year life of the Plan, using a 4 percent discount rate, the present net value of the recreation program on the Monument is -\$4,224,120. This analysis only considers financial costs and benefits accruing to the agency. The employment and income associated with these expenses is captured in the impacts from the BLM expenditures analysis, below, and the construction impacts, above.

Impacts from Trails and Travel Management – Impacts would be the same as under Alternative C except that the Cayenne Crawler Trail (0.4 miles) would be left open for motorized and mechanized use and modified to allow motorized and mechanized use on 0.9 miles of Patzcuaro's Revenge Trail. The difference between Alternative C and Alternative D is small in terms of the total available routes that the social and economic impacts are not expected to differ measurably between these alternatives. The difference in expected recreation use between Alternatives C and D is driven by the development of a visitor center, as opposed to a contact station, under Alternative D.

Impacts from Livestock Grazing – Impacts would be the same as Alternative A.

Impacts from Lands with Wilderness Characteristics – Alternative D would manage 0 acres (0 percent) of the Monument for wilderness characteristics. Alternative D would manage the same number of acres for wilderness characteristics as Alternative A; therefore, the social and economic impacts discussed under Alternative A also apply to Alternative D.

Impacts from BLM Expenditures – Salary and non-salary (e.g., equipment) expenditures related to PTNM management support approximately 5 jobs and \$287,000 in labor income in the local economy, annually. The construction and maintenance of the visitor center is excluded from these estimates.

Payments from the Monument to states and counties (e.g., PILT) total approximately \$13,000. These payments contribute to State and local budgets. Less than one job and approximately \$8,000 in labor income would be supported in the local economy, annually.

4.4.11 SOILS

Assumptions and Incomplete Information:

Soil resources would be managed to meet *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management (New Mexico Standards and Guidelines)*.

Soils would be managed to minimize erosion and maintain soil productivity.

Surface disturbance of soil, including compaction of soil or loss of vegetation cover, might increase water runoff and downstream sediment loads and lower soil productivity, which may degrade water quality, alter channel structure, and affect overall watershed health.

The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location within the watershed, soil characteristics, time and type and degree of disturbance, existing vegetation type and quantities, and climatic conditions.

The greatest anticipated impacts on soil resources would occur from surface disturbance associated with paleontological resources, trails and travel management, livestock grazing, and recreation and visitor services. Management actions would be designed to minimize impacts by implementing BMPs and other site-specific protection measures. These measures often cause localized, short-term, site-specific impacts on soil resources, but are designed to maintain soil productivity and stability in the long-term. Restricting or prohibiting surface disturbance would often help maintain or improve soil conditions.

Management Decisions with No Impacts to Soils: The following resources or uses have little or no impact on Soil Resources for all Alternatives: Air Resources – Air Quality and Climate Change, Cultural Resources, Geology/Minerals, Lands with Wilderness Characteristics, Special Designations, Special Status Species, Visual Resources, Water Resources, and Wildlife.

Effects Common to All Alternatives:

Impacts from Vegetation Management – Under all Alternatives, the impacts from Vegetation would have very similar effects on soil resources. All of the Alternatives would have positive impacts to the soils by reducing and managing noxious weeds and non-native invasive plant species and promoting healthy native plant communities. This would enhance infiltration, increase soil moisture and organic content, and promote soil productivity and stabilization.

IMPACTS OF THE ALTERNATIVES

4.4.11.1 ALTERNATIVE A

Impacts from Paleontological Resources and Scientific Values – The Paleontology Program would continue to permit and support the on-going research within the PTNM, including excavation of fossils. Excavations may cause localized highly disturbed areas. Many of the past excavations within the PTNM have been on relatively steep slopes where erosion potentials are the highest. Mitigation measures are generally adequate for stabilizing these soils after excavation, but soil loss on steep slopes, void of vegetation, is inevitable. However, these activities are typically small in scale and have had little impact to the watershed as a whole. Casual collecting of paleontological resources would result in minor surface disturbance at infrequent intervals from foot traffic and hand tools.

Impacts from Education and Interpretation – Under Alternative A, minor soil disturbance would occur along designated trails at infrequent intervals associated with BLM or partner-led interpretive tours. Disturbances would primarily be in the form of foot traffic from small groups of people.

Impacts from Recreation and Visitor Services – Under Alternative A, dispersed camping could cause localized removal of vegetation and compaction of the soil leading to increased runoff and erosion. Although impacts from camp sites are generally isolated and small, no restrictions on camping locations could result in multiple camp sites cumulatively adversely impacting a greater area. Commercial, competitive and organized group activities would be administered through the SRP program. Each event permitted through the SRP would require mitigation on a case-by-case basis due to varying impacts associated with event type, size, and location.

Impacts from Trails and Travel Management – Under Alternative A, designated routes would be available for motorized or mechanized use. Many of these routes are in the bottom of arroyos. Colluvial deposits along the slopes of the canyons are easily eroded and could be damaged by impacts from both vehicles and spectators. This degradation is caused by both non-permitted use and permitted events. BLM monitoring of the 2008 and 2009 Chile Challenge Trails Tour confirmed that visitor and spectator use of canyon slopes for event viewing resulted in creation of new trails, dislocation and displacement of soils and large cobbles and damage to vegetation. OHV trails are primarily located along canyon bottoms and ridge tops that are relatively resistant to erosion. These areas have essentially been compacted, devoid of vegetation and soil, and have very low potential for natural recovery. Petroleum product spill would contaminate soils in various locations along OHV routes reducing soil productivity and potentially lower vegetation densities in the long-term. However, the volume of fluid spilled at any given location is typically small (less than 1 gallon). Where “*braided*” routes (i.e., routes that are used to get around an inoperative vehicle or obstacle) are created, vegetation is crushed and soils are disturbed or compressed. These impacts contribute to increased susceptibility to erosion and sediment load during water runoff. Localized site mitigation measures would be employed to reduce or stop slope and channel erosion and degradation of site-specific important fossil bearing formations from OHV activities. Proper mitigation measures could reduce localized sediment movement from slopes and channels caused by OHV activities.

Impacts from Lands and Realty – Under Alternative A, realty actions such as right-of-way or land use authorization would be allowed. Authorizations of rights-of-way could cause adverse impacts to soils from surface disturbances. Each lands and realty action would require mitigation on a case-by-case basis due to varying impacts associated with action type, size, and location.

Impacts from Livestock Grazing – Under Alternative A, grazing would continue within the Monument. High impact areas around livestock watering facilities would continue to have less vegetation cover, which reduces water infiltration and increases water runoff. Soils would be more compacted around watering points and water infiltration rates would be reduced decreasing soil moisture contents. This would cause localized soil erosion from alluvial and eolian processes. Maintenance of existing structural improvements (e. g., pipeline and troughs) and potential new improvements could result in surface disturbance. These disturbances would likely cause localized short-term soil loss and degradation. Utilization of vegetation from cattle would reduce plant cover; increasing bare ground and decreasing soil moisture. This would increase the likelihood of soil movement. However, the high surface rock content is the primary soil stabilization factor and overall erosion associated with livestock should be slight.

Impacts from Wildland Fire Management – Under Alternative A, management tools such as prescribed fire and mechanical thinning would not be considered for use in the Monument. Fire suppression tactics that cause surface disturbance could cause localized short-term impacts to soil in wildland urban interface areas.

4.4.11.2 ALTERNATIVE B

Impacts from Paleontological Resources and Scientific Values – Under Alternative B, the impacts are similar as described under Alternative A. However, under this Alternative, soil disturbance would be slightly less with the closure of the PTNM to casual collecting of common invertebrates and plant fossil resources. These actions would cause less surface disturbance relative to Alternative A.

Impacts from Education and Interpretation – Under Alternative B, impacts to soils from Education and Interpretation are the same as described under Alternative A.

Impacts from Recreation and Visitor Services – Under Alternative B, camping would not be allowed within the Monument. Current camp sites would be rehabilitated and allowed to recover to the natural surroundings over time, which would reduce impacts to soils such as compaction and erosion. SRPs would not be permitted, so there would be no impacts from such events as previously permitted.

Impacts from Trails and Travel Management – Under Alternative B, closing the PTNM to motorized and mechanized vehicles would have fewer impacts on soil resources than Alternative A. Recreational OHVs would not be traveling on trails, and no new trails would be created. This would decrease soil disturbances. However, these routes, which mostly are in arroyos, have little potential for recovery due to natural flash floods and the overall slow nature of soil formation processes in semi-arid climates. Natural rehabilitation of the trails would be a very long process.

Impacts from Lands and Realty – Under Alternative B, surface disturbing activities would not be authorized. Soil resources would not be altered or impaired.

Impacts from Livestock Grazing – Under Alternative B, removal of grazing from these allotments would provide less impact to soils, such as less compaction around waters and trails. Additionally, removal of grazing from the Monument would decrease the utilization of vegetation; this would result in greater amounts of biomass remaining, potentially resulting in higher infiltration rates and increased soil moisture. The degree to which vegetation maintains or improves infiltration and soil moisture, with respect to potential vegetation increases, would depend on factors such as precipitation, the current location, density and type(s) of vegetation present, future growth rates, potential increases of ground cover, and types of vegetation that become established.

Impacts from Wildland Fire Management – Under Alternative B, impacts to soils from wildland fire management are the same as described under Alternative A.

4.4.11.3 ALTERNATIVE C

Impacts from Paleontological Resources and Scientific Values – Under Alternative C, impacts to soils from paleontological resources are the same as described under Alternative A.

Impacts from Education and Interpretation – Under Alternative C, impacts to soils from interpretation and education are the same as described under Alternative A.

Impacts from Recreation and Visitor Services – Under Alternative C, designated primitive campsites would be established. Impacts from camping would be similar to Alternative A; however, primitive campsites would reduce the impacts to soil compared to dispersed camping. Designating specific campsites would control the locations resulting in better managed and maintained camping facilities. Visitor facilities such as toilets, shade shelters, kiosks, picnic sites, and parking lots would result in

ground clearing and compaction activities. This would remove vegetation, compact soil, alter the natural topography, decrease infiltration and increase surface water runoff and erosion rates. The magnitude of these effects from a specific action would greatly depend upon the size, location, current climatic conditions and soil type for any given surface disturbing activities.

Impacts from activities through the SRP program would be the same as Alternative A.

Impacts from Trails and Travel Management – Under Alternative C, impacts to soil resources would be similar to, but slightly less than Alternative A. The nature of impacts to soils would be the same, but the length of designated trails would be less. In total, 5.4 miles of routes would be closed to motorized and mechanized vehicles and the same long-term impacts would occur to soils as identified in Alternative B. Increased visitation and foot traffic could lead to accelerated erosion and slope destabilization in the areas that are heavily visited. With well-placed, properly engineered and marked trails, impacts would be monitored and stabilizing mitigation measures would be used before damage occurs.

Impacts from Lands and Realty – Under Alternative C, impacts to soils from lands and realty are the same as described under Alternative A.

Impacts from Livestock Grazing – Under Alternative C, impacts to soils from livestock grazing are the same as described under Alternative A.

Impacts from Wildland Fire Management – Under Alternative C, impacts to soils from wildland fire management are the same as described under Alternative A.

4.4.11.4 ALTERNATIVE D

Impacts from Paleontological Resources and Scientific Values – Under Alternative D, impacts to soils from paleontological resources are the same as described under Alternative B.

Impacts from Education and Interpretation – Under Alternative D, impacts to soils from interpretation and education are the same as described under Alternative A.

Impacts from Recreation and Visitor Services – Under Alternative D, developed campgrounds along with designated primitive camping sites would have greater impacts than Alternatives A, B, and C due to larger areas of surface disturbance and compaction. All other impacts from actions initiated by recreation and visitor services would be the same as Alternative C.

Impacts from Trails and Travel Management – Under Alternative D, the nature of the impacts to soils from trails and travel management are the same as described under Alternative A. However, 4.0 miles of existing designated routes would be closed to motorized and mechanized vehicles. Along these closed routes, the same long-term impacts would occur to soils, as those identified in Alternative B.

Impacts from Lands and Realty – Impacts to soils are the same as described under Alternative A.

Impacts from Livestock Grazing – Impacts to soils are the same as described under Alternative A.

Impacts from Wildland Fire Management – Under Alternative D, prescribed fire and mechanical thinning are allowed as management tools if deemed necessary in the future. Fire suppression tactics and mechanical thinning that cause surface disturbance would cause localized short-term impacts to soil.

4.4.12 SPECIAL DESIGNATIONS

4.4.12.1 AREA OF CRITICAL ENVIRONMENTAL CONCERN

Assumptions and Incomplete Information: The PTNM legislation states “*The establishment of the Monument shall not change the management status of any area within the boundary of the Monument that is –(B) managed as an area of critical environment concern.*”

Management Decisions with No Impacts to Special Designations – ACEC: The proposed BLM management decisions in the Alternatives would not result in impacts that would alter the characteristics for which the ACEC was designated (significant paleontological, cultural, and scenic values, and high diversity of cacti species).

4.4.12.2 RESEARCH NATURAL AREA

Management Decisions with No Impacts to Special Designations-RNA: See discussion below in “*Effects Common to All Alternatives.*”

Effects Common to All Alternatives: Management actions for all resources and uses would be similar on the land within the Monument whether it has the Paleozoic Trackways RNA designation (Alternative A) or the RNA designation removed (Alternatives B, C, and D). The Monument designation duplicates the management goals of the RNA; protect, research, and interpret paleontological values to the entire Monument. Therefore, the RNA designation and management actions are redundant and not necessary.

4.4.12.3 WILDERNESS STUDY AREA

Assumptions and Incomplete Information: The PTNM legislation “*The establishment of the Monument shall not change the management status of any area within the boundary of the Monument that is – (A) designated as a wilderness study area and managed in accordance with section 603(c) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1782(c).*”

The Robledo Mountains WSA would be managed to preserve its wilderness characteristics so as not to impair the area’s suitability for wilderness designation. All proposed actions within the WSA must follow the *Management of Wilderness Study Areas Manual* 6330.

Management Decisions with No Impacts to Special Designations-WSA: The following resources or Monument uses have little or no impact on the Robledo Mountains WSA: Paleontological Resources, Air Resources, Cultural Resources, Special Management Areas- Area of Critical Environmental Concern and Research Natural Area, Special Status Species, Visual Resources, Water Resources, and Wildlife.

Effects Common to All Alternatives: No alternatives considered would result in impairment to the WSA.

4.4.13 SPECIAL STATUS SPECIES

Assumptions and Incomplete Information: There is only one recorded occurrence of a special status plant (night-blooming cereus) near the Monument and a substantial amount of habitat for this plant occurs throughout the Monument. If there were losses, they would be at an individual level rather than the entire population.

Prior to any construction, a field survey would be completed and any special status species found within the construction site would be avoided or mitigated.

If additional special status species are designated or discovered, or critical habitat is designated on the Monument, the BLM would adopt subsequent recovery plans or species specific guidance.

Management Decisions with No Impacts to Special Status Species: The following resources or uses have little or no impact on Special Status Species: Paleontology, Air Quality and Climate Change, Cultural Resources, Lands and Realty, Socio-Economic Conditions, Soils, Special Designations- Area of Critical Environmental Concern and Research Natural Area, Visual Resources, and Water Resources.

IMPACTS OF THE ALTERNATIVES

4.4.13.1 ALTERNATIVE A

Impacts from Education and Interpretation – Under Alternative A, there would be no management actions for interpretation and education that would impact special status species.

Impacts from Trails and Travel Management – Under Alternative A, there are approximately 37.6 miles of motorized and mechanized routes and 5.3 miles of trail for mechanized vehicle use only open year-round. Authorized use of those routes could potentially cause injury or mortality of slow moving special status animals such as Texas horned lizards that may inhabit areas near these routes. Special status bat species would not be impacted as there are no suitable roosting habitat near routes. Burrowing owls and loggerhead shrikes may temporarily vacate areas near routes that are being used. Traffic that may be present on these routes would not occur regularly and would not permanently displace special status species that would potentially inhabit areas adjacent to the routes. No impacts would be expected on night-blooming cereus plants as they do not occur in disturbed areas such as trails and routes that would be open under Alternative A.

Impacts from Livestock Grazing – Under Alternative A, livestock grazing would continue within the Monument and livestock grazing improvements would continue to function. Grazing improvements such as water facilities would benefit special status animals due to continued availability of water in an area in which water would not naturally occur. Trampling of night-blooming cereus may occur, but it is unlikely as livestock do not congregate in creosote shrublands which is primarily where night-blooming cereus is likely to occur. If any mortality of night-blooming cereus takes place, it would be at an individual level and not at a population wide scale. Special status bats that may occur in the Monument would potentially utilize the earthen reservoirs during times when water would be present. Bats would potentially forage for flying insects that may be present around the tanks during the summer months. Troughs would be utilized more throughout the year as they would hold water in times when earthen reservoirs or dirt tanks may be dry. Troughs would be fitted with wildlife escape ramps to prevent drowning of bats that may fall into troughs. Impacts to special status birds and reptiles would be minimal as they currently coexist with livestock and typically avoid areas of high concentrations of livestock such as troughs.

Impacts from Vegetation – Chemical herbicides would be used to control noxious weeds within the Monument, including existing populations and those that may be introduced over time. Herbicides would also be used to treat areas where mesquite or creosotebush have become out of balance with the desired plant community and are competing with desirable native plant species. Any vegetation treatments that may occur would benefit special status animals by increasing forage and improving grassland habitat. Due to its association with creosote and mesquite, night-blooming cereus may be affected by large scale vegetation treatments. Although some individual plants may suffer mortality, the entire local population would not be harmed. Surveys of the treatment areas would also take place and any special status plants identified would be buffered from treatment. Bats would not be impacted by chemical treatments as they do not use the habitats that contain large amounts of shrubs that would be treated. Over time as grasses are expected to move into treatment areas, more insects would be expected to be present during wet periods during the late summer and early fall. These insects would be a valuable food source for burrowing owls, loggerhead shrikes, and Texas horned lizards.

Impacts from Wildland Fire Management – Under Alternative A, there would be no management actions for wildland fire management that would impact special status species.

4.4.13.2 ALTERNATIVE B

Impacts from Education and Interpretation – Under Alternative B, there would be no management actions for interpretation and education that would impact special status species.

Impacts from Recreation and Visitor Services – Under Alternative B, recreational use of the Monument under Alternative B would be limited to hunting, hiking, and sightseeing. This use would temporarily disturb special status species such as burrowing owls, loggerhead shrikes, and Texas horned lizards in general. Increased human presence would also potentially bring about harassment and potential illegal collection of Texas horned lizards. No camping would be allowed; therefore, displacement would be limited to day-use associated with dispersed recreation. This temporarily displaces special status species in areas where the recreation is occurring. There is only one recorded occurrence of a special status plant (night-blooming cereus) near the Monument and a substantial amount of habitat for this plant occurs throughout the Monument that if there were losses, they would be at an individual level rather than the entire population. SRP events would not be allowed, thus the impacts from those events would not occur. Special status bats would not be impacted because they are primarily active at night when recreation impacts would not be occurring.

Impacts from Trails and Travel Management – Motorized and mechanized use would be prohibited thus minimizing the chance of slow moving special status species such as Texas horned lizards to be injured on and near travel routes. No impacts would occur to other special status species.

Impacts from Livestock Grazing – Under Alternative B, livestock grazing would not continue within the Monument. Availability of forage for species such as burrowing owls, loggerhead shrikes, and Texas horned lizards and cover would increase as grasses and forbs would be expected to increase in certain areas. This would be beneficial to these special status species. Artificial water sources and earthen reservoirs would be maintained by the BLM primarily for wildlife use. Should pipelines and troughs be retained for use by wildlife, modifications to the facilities may be needed, or a new water source would need to be found to supply water to these facilities, as the existing source is a well on private land not under the jurisdiction or control of the BLM. These water sources would continue to be available for bats to forage over and drink out of. Troughs would be fitted with wildlife escape ramps to prevent drowning of bats that may fall into these troughs. Night-blooming cereus plants that may occur in areas frequented by livestock would be under no threat of trampling by cattle.

Impacts from Vegetation – Impacts to special status species from vegetation management under this Alternative would be similar to those outlined under Alternative A. Passive treatment methods would allow for finer scaled treatment of target species such as creosote and mesquite, and impacts to night blooming cereus that would occur with chemical treatments would be avoided. If biological methods of controlling the brush were used, impacts to night-blooming cereus would be the same as in Alternative A. No impacts to other special status species would occur.

Impacts from Wildland Fire Management – Under Alternative B, there would be no management actions for wildland fire management that would impact special status species.

4.4.13.3 ALTERNATIVE C

Impacts from Education and Interpretation – Under Alternative C, pedestrian trails and interpretation kiosks would be developed. This would potentially bring an increase in human traffic causing special status animal species such as burrowing owls, loggerhead shrikes, and Texas horned lizards to temporarily vacate the area near the trails and kiosks. No impacts on bats or night-blooming cereus would occur as the interpretive kiosks and pedestrian trails would not be constructed where habitat is present.

Impacts from Recreation and Visitor Services – Visitor facilities such as toilets, shade shelters, information kiosks, trail markers, and picnic sites would be developed and maintained. This could displace special status species such as burrowing owls, loggerhead shrikes, and Texas horned lizards that may inhabit the area where these facilities would be built and used. Dispersed recreation would continue and also continue to temporarily displace these special status species in areas where the recreation is occurring. The establishment of a primitive campground would displace any special status species that inhabits the area where the campground would be built. An increase in human activity would temporarily cause some special status species to vacate areas frequented by humans. Increased human presence would also potentially bring about harassment and potential illegal collection of Texas horned lizards. Special status bats may roost in newly-constructed facilities and may become a nuisance, but as bats are mostly active at night, these impacts would be minimal.

Impacts from Trails and Travel Management – Under Alternative C, there are approximately 26.9 miles of motorized and mechanized routes and 5.3 miles of trails for mechanized vehicles only (such as bikes) open for use. Due to the use allowed on certain routes, there would be potential for slow moving special status species to be injured on and near travel routes. This risk would increase during SRP events where a greater number of vehicles or people would be on the routes. Impacts to special status species would be similar to impacts discussed in Alternative A.

Impacts from Livestock Grazing – Under Alternative C, grazing would continue except where excluded to protect paleontological resources, campsites, or other specified locations where other unresolved resource conflicts arise. Grazing improvements such as water facilities would benefit special status species due to continued availability of water in an area in which water would not naturally occur. Trampling of night-blooming cereus may occur, but it is unlikely as livestock do not congregate in creosote shrublands which is primarily where night-blooming cereus is likely to occur. If any mortality of night-blooming cereus takes place, it would be at an individual level and not at a population wide scale. Impacts would be similar to those discussed in Alternative A, however if areas are excluded from grazing, impacts at those locations would be the same as Alternative B.

Impacts from Vegetation – Impacts to special status species from vegetation management under this Alternative would be similar to those outlined under Alternative A.

Impacts from Wildland Fire Management – Under Alternative C, there would be no management actions for wildland fire management that would impact special status species.

4.4.13.4 ALTERNATIVE D

Impacts from Education and Interpretation – Development of kiosks would bring an increase in human traffic causing special status species to temporarily vacate the area near the trails and kiosks. Impacts would be similar to Alternative C.

Impacts from Recreation and Visitor Services – Under Alternative D, development of pedestrian trails would potentially bring an increase in human traffic causing special status species to temporarily vacate the area near the trails. Impacts would be similar to Alternative C. The establishment of an on-site visitor center would displace special status species from the site chosen for the visitor center. Activities associated with the construction of the visitor center could potentially lead to mortality of slow moving special status species such as Texas horned lizards which are unable to quickly vacate the area. Recreational use of the Monument under Alternative D would lead to a possibility of the establishment of a developed campground which would displace any special status species that inhabits the area where the campground would be built.

Impacts from Trails and Travel Management – Under Alternative D, new routes or trails could be constructed and maintained. There are approximately 28.3 miles of motorized and mechanized routes and 5.3 miles of trails for mechanized use only proposed for use. The establishment of new routes or trails would create a potential for slow moving special status species to be injured or killed on and near travel routes. Vehicular use of the Monument would not be prohibited therefore there would be potential for slow moving special status species to be injured on and near travel routes. This risk would increase during special events where a greater number of vehicles would be utilizing the routes. Impacts would be similar to Alternative A.

Impacts from Livestock Grazing – Under Alternative D, impacts to special status species from livestock grazing are the same as described under Alternative A.

Impacts from Vegetation – Under Alternative D, impacts to special status species from vegetation management would be the same as those outlined under Alternative A.

Impacts from Wildland Fire Management – Under Alternative D, prescribed fire is allowed as a management tool. Prescribed fire could displace, kill, and render habitat unsuitable for special status species for longer durations of time than a one-time event, road construction, or some other short duration disturbing activity. The long-term positive benefits of prescribed fire to the overall ecosystem would be substantial.

4.4.14 VEGETATION

Assumptions and Incomplete Information: It is assumed that under Alternatives A, C, and D, visitation would steadily increase over the life of the Plan.

Management Decisions with No Impacts to Vegetation: The following resources or uses have little or no impact on Vegetation: Paleontological Resources, Education and Interpretation, Air Resources, Cultural Resources, Lands and Realty, Special Designations, Visual Resources, and Water Resources.

Effects Common to All Alternatives

Impacts from Vegetation – Under all Alternatives, plant collecting without a permit is not allowed within the Monument. By not allowing plant collecting, this would help to protect native vegetation diversity and abundance directly benefiting wildlife, and helping protect the soil from erosion.

Impacts from Special Designations – The ACEC and WSA designations limit surface disturbance.

Impacts from Education and Interpretation – Under all Alternatives, impacts to vegetation would be impacted by tours to fossil sites. Inadvertent trampling of vegetation by groups would occur along designated trails and at interpretive sites.

Impacts from Wildland Fire Management – Under all Alternatives, fires would be suppressed and hazardous fuels would be treated in wildland urban interface areas. Under the current fire management direction for the Robledo Mountains, vegetation would be disturbed by wildfires and fire suppression activities.

IMPACTS OF THE ALTERNATIVES

4.4.14.1 ALTERNATIVE A

Impacts from Education and Interpretation– Under Alternative A, interpretive facilities would not be developed so there would be no loss of vegetation that would result from the installation of structures, signs, exhibits and trails. Self-guided interpretive activities could result in the trampling of vegetation since visitor access routes would be limited and more cross-country access could occur.

Impacts from Recreation and Visitor Services – Under Alternative A, increased visitor use would likely result in disturbance to vegetation through hiking cross-country, and could result in the introduction and spread of noxious and invasive weeds through vehicles or clothes contaminated by weed seeds.

Impacts from Trails and Travel Management – Under Alternative A, the existing routes would continue to be used for motorized, mechanized, and pedestrian travel. Designated routes within the Monument are also used by the grazing permittee for managing cattle and maintaining range improvements. Activities associated with the use of these trails and roads would have the potential to remove or damage vegetation within and adjacent to these routes. The potential exists for vehicles and hikers to introduce and contribute to the spread of noxious and invasive weeds. Typically this can occur when people and vehicles travel through weed infested areas, and seeds are picked up and become stuck to vehicles and clothing. Subsequently, seeds can then drop in areas free of weed infestations. Soil disturbance from vehicles traveling off of existing roads can create areas more susceptible to invasion by noxious weeds.

Impacts from Lands and Realty – Under Alternative A, vegetation disturbance including damage or removal would occur within or adjacent to surface disturbing authorizations. Development of non-Federal minerals would result in further vegetation disturbance.

Impact from Lands with Wilderness Characteristics – Under Alternative A, no lands with wilderness characteristics within the Monument would be managed for those characteristics. Surface disturbing activities are allowed and may potentially impact vegetation.

Impacts from Livestock Grazing – Under Alternative A, livestock would continue to graze public land forage. A total of 456 AUMs of forage have been allotted to livestock on the public land within the Monument on an annual basis. Due to the rugged terrain, and the location of water and supplements, cattle distribution and forage utilization would not be uniform across the entire Monument. Areas where livestock congregate, particularly in the vicinity of livestock waters, typically experience a higher impact to vegetation than other areas that are further from these water sources. Research in the Chihuahuan Desert indicates that biomass of perennial grasses can be reduced up to 1,000 meters from water (Fusco *et al.* 1995). As the distance from water increases, these impacts are reduced as livestock become more dispersed throughout the landscape.

Currently, livestock that graze in the majority of the Monument are managed under a deferred-rotation grazing system as prescribed in the Picacho Peak Allotment Management Plan. Under this Plan, forage utilization targets have been established, where use would not exceed 50 percent of the current year's growth for most perennial grass species. For black grama, maximum forage utilization allowed is more restrictive at 40 percent use for the north pasture and 35 percent in the south pasture. Since the revision of the management plan in 1997, the allotment has been stocked at a maximum of 58 percent of the permitted carrying capacity, thus actual forage removed has been substantially lower than the maximum allowed. Reductions in actual numbers of livestock on the allotment have been made voluntarily to allow for conservation of forage resources when possible and to respond to decreased production as a result of periodic drought conditions.

The southern part of the Altamira Allotment is not typically stocked with cattle resulting in very minimal use by livestock due to the terrain and the lack of developed water. Any new water developments in the southern part of the Altamira Allotment would alter grazing use in this area, and would result in increased forage use. In addition to changes in grazing use, vegetation would also be disturbed in order to construct future range improvements, such as watering facilities, fences, erosion control structures and pipelines.

Livestock grazing has the potential to introduce Class A, B, or C noxious weeds into an area through consumption of feed contaminated with weed seed; however, this is unlikely since maintenance feeding of livestock is not authorized. It is more likely that cattle could introduce weed species through the introduction of seeds that are stuck to animal hair, or when seeds are consumed and then later excreted. Subsequently seeds can then be transported and dropped in areas free of weed infestations. This mechanism can also contribute to the spread of noxious weeds by cattle from populations that may become established within or adjacent to the Monument by other means. Introduction of noxious weeds by cattle would most likely occur when replacement animals are brought in from other ranches or auctions and added to the herd on the allotment. Ground disturbances from livestock tend to be more pronounced in areas of livestock concentration, which can increase susceptibility of these areas to invasion by noxious weeds. Livestock grazing is not anticipated to influence the spread or vigor of salt cedar populations.

Impacts from Soils – Under Alternative A, critical soils on slopes over 10 percent would be a priority for altering grazing management to reduce erosion and improve water quality. Loss of soil due to erosion would impact soil fertility, and could result in shifts in the type of vegetation and species that can grow in

a particular area. Research indicates that black grama dominated ecosystems in southern New Mexico are at risk from nutrient imbalances as a result of wind erosion, which can also shift the competitive advantage to shrubs (Li *et al.* 2009). Additionally, soil disturbance and erosion could result in areas favoring colonization by weeds, which would compete with native perennial vegetation.

Soil disturbing activities would be authorized with proper mitigation to protect air and water quality. Soil disturbances would likely lead to loss of vegetative cover, which would typically be temporary and limited to the construction phase of a project. Rehabilitation of vegetation on sites following surface disturbing activities would depend on the specific project, and would be analyzed on a site-specific basis.

Impacts from Vegetation – Noxious weed invasions and increases of shrub species in a manner that is out of balance with desired ecological condition results in increased competition with desired herbaceous plants for water and nutrients. Under Alternative A, the management action to control noxious weeds is to use chemical herbicides. Currently, no known populations of Class A or B noxious weeds have been identified within the Monument. Individual plants and small populations of the Class C noxious weed saltcedar (*Tamarix ramosissima*) have been discovered in an earthen reservoir within the Monument and in ephemeral drainage areas within and adjacent to the Monument. Continued monitoring of the Monument by the BLM would allow for the discovery and rapid treatment of noxious weeds. When future weed surveys are conducted on the Monument, particular emphasis would continue to be placed on areas most susceptible to invasion and spread of noxious weeds, including trails, trailheads, livestock watering points, corrals, roads, and any other developed visitor facilities.

Vegetation management treatments under this Alternative would primarily be carried out using herbicides, and would certainly result in a shift of the species dominating treated areas. In many areas of the Monument, creosotebush dominates the landscape. Recent mapping of vegetation states indicates that there is potential for restoration in shrub-dominated areas in the Limestone Hills ecological site, which makes up approximately 53 percent of the Monument. However, given the rugged terrain and the prescription for using herbicides on areas with slopes less than 10 percent, much of the Monument would not be treatable using chemical control methods. There might be opportunity to treat creosotebush on level or gently sloping areas, while leaving the steeper slopes and draws untreated, resulting in a mosaic of vegetation types.

Existing long-term monitoring transects are established on the Monument. These transects would be revisited periodically to track changes in cover, production, and utilization of vegetation in the Monument. Large-scale shrub treatments would likely have paired plot monitoring transects established to track shrub mortality and the response of herbaceous vegetation.

Impacts from Wildlife – Under all Alternatives, the Robledo Mountains Habitat Management Plan (HMP) (for deer, antelope, upland game species) would be developed and implemented. Mule deer would continue to graze herbaceous plants and browse palatable woody plant species. Areas dominated by shrub cover tend to be at a higher risk of plant seedling predation by rodents in the Chihuahuan Desert (Bestlemeyer *et al.* 2007); as a result, continued shrub invasion by creosotebush and mesquite could potentially result in decreased establishment of perennial forage plants through this mechanism. The potential exists for wildlife to introduce and contribute to the spread of noxious and invasive weeds. Typically this can occur when animals travel through weed infested areas, and seeds are picked up and become stuck to the fur, or when seeds are consumed and then later excreted. Subsequently, seeds can then be transported and dropped in areas free of weed infestations.

4.4.14.2 ALTERNATIVE B

Impacts from Education and Interpretation – Under Alternative B, the impacts to vegetation from Education and Interpretation would be similar to those described under Alternative A.

Impacts from Trails and Travel Management – Under Alternative B, the Monument would be closed to motorized or mechanized recreation and SRPs, and this would reduce the potential for damage to vegetation adjacent to existing roads and trails. The risks associated with introduction and spread of noxious weeds by vehicles would be reduced.

Impacts from Lands and Realty – Under Alternative B, no surface disturbing authorizations would be allowed, therefore, no disturbance to vegetation would occur and there would be no impacts from lands and realty. The subsurface estate would be acquired, and no surface disturbing activities would impact vegetation from any lands and realty actions.

Impacts from Lands with Wilderness Characteristics – Under Alternative B, approximately 576 acres would be managed as lands with wilderness characteristics. Additional protections to vegetation from limiting surface disturbance would be provided to lands with wilderness characteristics. Therefore, impacts to the vegetation would be minimal.

Impacts from Livestock Grazing – Under Alternative B, the Monument would be closed to livestock grazing, and this would reduce the amount of plant biomass utilized. The 456 AUMs of forage allotted to livestock annually would not be harvested from the Monument. Over time, it is expected that cover, plant density, species diversity and plant production would increase, although the magnitude of the increase would vary. Changes to plant community composition are likely to be more noticeable in high impact areas near livestock watering facilities. Given the fact that the vegetation within the majority of the Monument is lightly utilized, widespread changes to the vegetation are not expected from removing livestock grazing pressure. The risks associated with introduction and spread of noxious weeds by livestock would be reduced. In addition, there would be an increase in fine fuels, which would allow fires to burn more readily in the Monument.

Impacts from Soils – Under Alternative B, surface disturbing activities within the Rio Grande watershed and areas with high potential for soil erosion would be prohibited. These limitations on surface disturbing activities would result in maintenance of ground cover and could lead to increased production of vegetation.

Impacts from Vegetation – Under Alternative B, vegetation would be managed according to an integrated approach primarily using passive methods, but also employing manual and biological strategies in order to move toward the potential natural community of ecological sites. Plant community shifts toward the desired condition would occur at a reduced rate compared with the other alternatives, and ultimately goals for plant community composition may not be achieved through passive means alone. Treatment options would be limited for noxious weed control, and strategies would be dependent on the species present and the size of the infestation.

Impacts from Wildland Fire Management – Impacts to vegetation under Alternative B would be the same as those discussed under Alternative A.

Impacts from Wildlife – Under all Alternatives, the Robledo Mountains HMP (for deer, antelope, upland game species) would be developed and implemented. It is anticipated that wildlife populations would increase due to increased forage availability and cover from lack of livestock grazing in

Alternative B. This could result in a shift in use patterns, with increased utilization of plant species favored by wildlife.

4.4.14.3 ALTERNATIVE C

Impacts from Education and Interpretation – Under Alternative C, the development of interpretive facilities such as a visitor contact station and interpretive trails and exhibits would require the removal of vegetation to accommodate these facilities, and the continued removal as maintenance. It is also possible that visitors to these facilities, especially if in large groups, will trample or crush vegetation in areas adjacent to interpretive facilities. Visitors engaging in self-guided interpretive activities may venture into areas not serviced by a constructed trail, and could trample and crush vegetation as a result.

Impacts from Recreation and Visitor Services – Under Alternative C, disturbance to vegetation would occur in order to construct visitor facilities. Disturbance to vegetation would mainly occur during construction activities; however, increased use in high traffic areas may result in continual disturbances that would reduce vegetative cover in some areas. Vegetation would be lost in areas where permanent visitor facilities would be constructed.

Impacts from Trails and Travel Management – Under Alternative C, disturbance to vegetation would occur in order to construct or develop new trails. Increased use on these new trails or routes would result in reduced vegetative cover.

Impacts from Lands and Realty – Impacts to vegetation from lands and realty under Alternative C would result from vegetation disturbance including damage or removal that would occur within or adjacent to new rights-of-way or land use authorizations. The subsurface estate would be acquired and no surface disturbing activities would impact vegetation from any lands and realty actions.

Impacts from Lands with Wilderness Characteristics – Under Alternative C, approximately 253 acres would be managed as lands with wilderness characteristics. Additional protections to vegetation from limiting surface disturbance would be provided to lands with wilderness characteristics. Therefore, impacts to the vegetation would be minimal.

Impacts from Livestock Grazing – Impacts to vegetation from livestock grazing under Alternative C would be the same as those identified under Alternative A.

Impacts from Soils – Under Alternative C, mitigation of soil-disturbing activities would help to protect vegetation from excessive disturbance.

Impacts from Vegetation – Under Alternative C, vegetation management would focus on maintaining vegetative cover and production with regard to the current ecological potential of land within the Monument using passive and active treatments. Particular emphasis would be placed on maintaining and enhancing native plant populations and habitat for special status species.

Impacts from Wildland Fire Management – Impacts to vegetation from wildland fire management under Alternative C would be the same as those discussed under Alternative A.

Impacts from Wildlife – Impacts to vegetation from wildlife under Alternative C would be the same as those described under Alternative A.

4.4.14.4 ALTERNATIVE D

Impacts from Education and Interpretation - Impacts to vegetation would be similar to those described under Alternative C, except that invertebrate fossil collecting is allowed as an organized educational activity. Although this activity would be conducted with agency or partner oversight, and very little vegetation usually grows in these areas of the Monument, it is still possible that trampling of vegetation would occur.

Impacts from Recreation and Visitor Services – Impacts to vegetation would be the same as those described under Alternative C.

Impacts from Trails and Travel Management – Impacts to vegetation would be the same as those described under Alternative C.

Impacts from Lands and Realty – Impacts to vegetation would be similar to those discussed under Alternative C.

Impacts from Lands with Wilderness Characteristics – Impacts to vegetation would be the same as those described under Alternative A.

Impacts from Livestock Grazing – Impacts to vegetation from livestock grazing under Alternative D would be the same as those described under Alternative A.

Impacts from Soils – Impacts to vegetation from soil resources under Alternative D would be the same as those described under Alternative A.

Impacts from Vegetation – Under Alternative D, vegetation management objectives would focus on maintaining cover and production with regard to the current potential of ecological sites found within the Monument using active and passive restorative methods. Emphasis would be placed on maintaining or enhancing habitat for special status species in conjunction with maximizing plant production for use by livestock.

Impacts from Wildland Fire Management – Under Alternative D, fire would have a more prominent role in maintaining the health of the ecosystem by allowing prescribed fire and mechanical thinning. Fire would help to reduce shrub cover, and would favor re-establishment of fire-adapted perennial plant species. Fire has been found to have negative impacts to black grama (Allred and Snyder 2008); however the impact fire has to the survival and health of black grama is dependent on precipitation, fire temperature and grass patch size (Drewa *et al.* 2006).

Impacts from Wildlife – Impacts to vegetation from wildlife under Alternative D would be the same as those described under Alternative A.

4.4.15 VISUAL AND SCENIC RESOURCES

Assumptions and Incomplete Information: The number of visitors to the Monument would probably increase over time.

Per BLM policy, all land within WSAs is managed under a Visual Resource Management (VRM) Class I management objective until such time as the Congress decides to designate the area as wilderness or release it for other uses. This impact analysis assumes under all Alternatives that those lands that fall within the Robledo WSA (789 acres) would be managed to preserve the existing visual character of the landscape – where management activities would be limited, very low, and not attract attention.

Contrast ratings would be required for proposed projects in highly sensitive areas and for projects with the potential for high impact. Visual design considerations such as siting, color selection, and reclamation would be incorporated into all surface disturbing projects regardless of the anticipated size of the impact.

The location(s) of the proposed visitor contact station (Alternative C) and visitor center (Alternative D) are unknown at this time. Should future activity level planning propose locating such facilities within the Monument boundary, a visual contrast rating and impact analysis would be required to determine compliance or the need to amend the VRM class objective.

Scenic Resources are identified as one of the resources, objects, and values for which the Monument was established and are defined as the distinct geologic exposures of the Robledo Mountains in the context of the Permian fossils.

Management Decisions with No Impacts to Visual Resource Management: The following resources and uses would have little or no impact on Visual Resource Management within the Planning Area: Paleontological Resources, Air Resources, Cultural Resources, Special Status Species, Socio-Economic Conditions, Soils, Vegetation Management, Water Resources, Wildland Fire Management, and Wildlife.

IMPACTS OF THE ALTERNATIVES

4.4.15.1 ALTERNATIVE A

Under Alternative A, the potential level of visual resource impacts are as follows:

- 15 percent of the *Planning Area* (789 acres) would be managed under a VRM Class I objective where impacts from management activities should be very low,
- 17 percent of the *Planning Area* (932 acres) would be managed under a Class II objective where impacts from management activities should be low,
- 50 percent of the *Planning Area* would be subject to a moderate degree of visual impacts where 2,627 acres would be managed under a VRM Class III objective, and
- 18 percent of the *Planning Area* would be subject to a high degree of visual impacts where 932 acres would be managed under a VRM Class IV objective.

Table 4-2 provides an overall indication of the level of potential visual impacts with a comparison of the VRM objective to the corresponding visual inventory class rating.

Table 4-2 VRM Objectives Compared to Visual Resource Inventory Class Ratings Alternative A

TABLE 4-2 VRM OBJECTIVES COMPARED TO VISUAL RESOURCE INVENTORY CLASS RATINGS ALTERNATIVE A										
PROPOSED VRM CLASSES (ACRES)		VRI CLASS I (ACRES)		VRI CLASS II (ACRES)		VRI CLASS III (ACRES)		VRI CLASS IV (ACRES)		TOTAL
		789**	%	4,466	%	0	%	0	%	
VRM I	789*	789	100%	0	0%	0	0%	0	0%	789
VRM II	907	0	0%	907	20%	0	0%	0	0%	907
VRM III	2,627	0	0%	2,627	59%	0	0%	0	0%	2,627
VRM IV	932	0	0%	932	21%	0	0%	0	0%	932
Totals	5,255	789*	100%	4,466	100%	0	0%	0	0%	5,255
NOTES: * Robledo Mountains WSA ** Default VRI Class I for WSA										

Impacts from Education and Interpretation – Under Alternative A, most interpretation and education activities would occur off-site and outside of the *Planning Area*. Overall, the anticipated or potential visual impacts resulting from interpretive activities would be low and meet or exceed all VRM Class objectives.

Impacts from Recreation and Visitor Services – Under Alternative A, visual impacts resulting from dispersed recreational use (e.g., establishment of primitive campsites, fire rings, and pioneered foot trails) would continue and likely increase proportionally with the levels of visitor use. Overall, the anticipated or potential visual impacts resulting from recreational activities would be low and meet or exceed all VRM Class objectives.

Impacts from Trails and Travel Management – Under Alternative A, continued use of the existing road and trail network (37.6 miles) within the Monument would result in low level, site-specific visual impacts such as trail widening and vehicle pullouts. These anticipated impacts would not affect BLM's ability to manage visual resources to meet the proposed VRM objectives.

Impacts from Lands and Realty – Under Alternative A, the non-Federal minerals are subject to mining and the impacts commonly associated with mineral development (e.g., excavation, road construction, installation of facilities, etc.) would impact visual resources by causing visual disturbances that would not retain the existing visual character of the landscape. If new surface disturbing authorizations are issued, prior to construction, VRM objectives would be incorporated into design features so as to not impair the visual qualities of the landscape.

Impacts from Livestock Grazing – Under Alternative A, visual impacts related to livestock grazing activities and the range improvements would continue. The use of the area for livestock grazing is light; grazing intensity is at a more moderate level near watering points, but most places see slight to light use by livestock due to terrain. This is based on both historic utilization data, and more recent observations during range health assessments and allotment inspections. Construction of range improvements including fences, pipelines, and watering facilities would introduce short-term visual impacts resulting from soil disturbance and removal of vegetation; these impacts would diminish over time as disturbed soils darken, stabilize, and flatten, and natural regeneration of vegetation begins to occur. Long-term

impacts would result from continued visibility of fence posts, wire, and watering facilities. Further NEPA analysis would be required to determine site-specific impacts, appropriate mitigation, and compliance with VRM objectives.

4.4.15.2 ALTERNATIVE B

Under Alternative B, 73 percent of the *Planning Area* (3,915 acres) would be managed as VRM II as to retain the existing character of the landscape and where impacts from management activities should be low. The remaining 27 percent (1,365 acres) would be managed to preserve the existing character of the visual landscape where impacts from management activities should be very low (VRM I).

Table 4-3 provides an overall indication of the level of potential visual impacts with a comparison of the VRM objective to the corresponding visual inventory class rating.

Table 4-3 VRM Objectives Compared to Visual Resource Inventory Class Ratings Alternative B

TABLE 4-3 VRM OBJECTIVES COMPARED TO VISUAL RESOURCE INVENTORY CLASS RATINGS ALTERNATIVE B										
PROPOSED VRM CLASSES (ACRES)	VRI CLASS I (ACRES)			VRI CLASS II (ACRES)			VRI CLASS III (ACRES)		VRI CLASS IV (ACRES)	
	789**	%		4,466	%		0	%	0	%
VRM I	1,365*	789	100%	576	13%	0	0%	0	0%	1,365
VRM II	3,915	0	0%	3,915	87%	0	0%	0	0%	3,915
VRM III	0	0	0%	0	0%	0	0%	0	0%	0
VRM IV	0	0	0%	0	0%	0	0%	0	0%	0
Totals	5,255	789	100%	4,466	100%	0	0%	0	0%	5,255
NOTES: * Includes Robledo Mountains WSA and Lands with Wilderness Characteristics										
** Default VRI Class I for WSA										

Impacts from Education and Interpretation – Most interpretation and education activities would occur off-site. The overall potential for visual impacts resulting from interpretive and educational activities would be low to very low and meet with all proposed VRM Class objectives.

Impacts from Recreation and Visitor Services – Under Alternative B, the Monument would be closed to mechanized and motorized vehicle use and dispersed camping, which would reduce visual impacts resulting from tire tread and the establishment of primitive campsites, fire rings, and other recreation activities that impair the visual impacts to the land. The overall potential for visual impacts resulting from recreational activities would be low to very low and meet with all proposed VRM Class objectives.

Impacts from Trails and Travel Management – Under Alternative B, recreational motorized and mechanized vehicle use would not be allowed, and no new routes would be developed. Therefore, there would be no measureable impacts on visual resources.

Impacts from Lands and Realty – The non-Federal minerals would be acquired, and there would be no impacts from mineral development. Surface disturbing land use authorizations are not allowed, so there would be no impacts from visual resources on the Lands and Realty program.

Impacts from Livestock Grazing – Under Alternative B, the BLM would no longer authorize livestock grazing on the Monument. If a fence is built to facilitate implementation of Alternative B, then fence construction would introduce short-term visual impacts resulting from soil disturbance and removal of vegetation; these impacts would diminish over time as disturbed soils darken, stabilize, and flatten, and natural regeneration of vegetation begins to occur. Long-term impacts would result from posts and wire. An environmental assessment would be required to determine site-specific impacts, appropriate mitigation, and compliance with VRM objectives.

4.4.15.3 ALTERNATIVE C

Under Alternative C, 80 percent of the *Planning Area* (4,213 acres) would be managed as VRM II to retain the existing character of the landscape where impacts from management activities should be low and not attract attention. The remaining 20 percent of the *Planning Area* (1,042 acres) would be managed as VRM I to preserve the existing character of the visual landscape where impacts from management activities should be very low and must not attract attention.

Table 4-4 provides an overall indication of the level of potential visual impacts with a comparison of the VRM objective to the corresponding visual inventory class rating.

Table 4-4 VRM Objectives Compared to Visual Resource Inventory Class Alternative C

TABLE 4-4 VRM OBJECTIVES COMPARED TO VISUAL RESOURCE INVENTORY CLASS RATINGS ALTERNATIVE C										
PROPOSED VRM CLASSES (ACRES)		VRI CLASS I (ACRES)		VRI CLASS II (ACRES)		VRI CLASS III (ACRES)		VRI CLASS IV (ACRES)		TOTAL
		789*	%	4,466	%	0	%	0	%	5,255
VRM I	1,042*	789	100%	253	6%	0	0%	0	0%	1,042
VRM II	4,213	0	0%	4213	94%	0	0%	0	0%	4,213
VRM III	0	0	0%	0	0%	0	0%	0	0%	0
VRM IV	0	0	0%	0	0%	0	0%	0	0%	0
Totals	5,255	789*	100%	4,466	100%	0	0%	0	0%	5,255
NOTES: * Includes Robledo Mountains WSA and Lands with Wilderness Characteristics										
** Default VRI Class I for WSA										

Impacts from Education and Interpretation – Under Alternative C, visitor facilities such as wayside exhibits and information kiosks, would be developed. These facilities would introduce varying degrees of visual contrasts. Site-specific impacts, mitigation, and a determination of compliance with VRM objectives would be disclosed through activity level planning, associated NEPA documentation, and visual contrast ratings.

Impacts from Recreation and Visitor Services – Under Alternative C, visitor facilities such as a primitive campsites, toilets, shade shelters, trail markers, and picnic sites would potentially be developed. All of these facilities would introduce varying degrees of visual contrasts to the landscape. Site-specific impacts, mitigation, and a determination of compliance with VRM objectives would be disclosed through activity level planning, associated NEPA documentation, and visual contrast ratings.

Impacts from Trails and Travel Management – Under Alternative C, continued use of approximately 32.2 miles of the existing route and trail network would result in low level, site-specific visual impacts

such as trail widening and vehicle pullouts. These anticipated impacts would not affect BLM's ability to manage visual resources to meet the proposed VRM objectives. Construction of new routes or foot trails to improve access and meet visitor use demands would introduce varying degrees of visual contrasts (line, color, form, and texture) across the landscape. The location of any new routes or trails would be restricted to those areas outside of VRM Class I. Site-specific impacts, mitigation, and a determination of compliance with VRM objectives would be disclosed through activity level planning, associated NEPA documentation, and visual contrast ratings.

Impacts from Lands and Realty – Under Alternative C, the non-Federal minerals would be acquired and eliminate the opportunity for mineral development(s) and the associated impacts. If new surface disturbing authorizations are issued, prior to construction, VRM objectives would be incorporated into design features as to not impair the visual qualities of the landscape.

Impacts from Livestock Grazing – Impacts would be the same as described in Alternative A.

4.4.15.4 ALTERNATIVE D

Under Alternative D, 85 percent of the *Planning Area* (4,466 acres) would be managed as VRM II to retain the existing character of the landscape where impacts from management activities should be low and not attract attention. The remaining 15 percent (789 acres) would be managed as VRM I to preserve the existing character of the visual landscape where impacts from management activities would be very low. Table 4-5 provides an overall indication of the level of potential visual impacts with a comparison of the visual resource management objective to the corresponding visual inventory class rating.

Table 4-5 VRM Objectives Compared to Visual Resource Inventory Class Alternative D

TABLE 4-5 VRM OBJECTIVES COMPARED TO VISUAL RESOURCE INVENTORY CLASS RATINGS ALTERNATIVE D										
PROPOSED VRM CLASSES (ACRES)		VRI CLASS I (ACRES)		VRI CLASS II (ACRES)		VRI CLASS III (ACRES)		VRI CLASS IV (ACRES)		TOTAL
		789**	%	4,466	%	0	%	0	%	
VRM I	789*	789	100%	0	0%	0	0%	0	0%	789
VRM II	4,466	0	0%	4466	100%	0	0%	0	0%	4,466
VRM III	0	0	0%	0	0%	0	0%	0	0%	0
VRM IV	0	0	0%	0	0%	0	0%	0	0%	0
Totals	5,255	789*	100%	4,466	100%	0	0%	0	0%	5,255
NOTES: * Robledo Mountains WSA										
** Default VRI Class I for WSA										

Impacts from Education and Interpretation – Impacts to visual resources would be the same as those described under Alternative C.

Impacts from Recreation and Visitor Services – Impacts would be the same as described in Alternative C.

Impacts from Trails and Travel Management – Impacts to visual resources would be the same as those described under Alternative C.

Impacts from Lands and Realty – Impacts to visual resources would be the same as those described under Alternative C.

Impacts from Livestock Grazing – Impacts to visual resources would be the same as those described under Alternative A.

4.4.16 WATER RESOURCES

Assumptions and Incomplete Information: The analysis of impacts on water resources was based on the following assumptions:

Hydrologic processes would be managed to meet *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management (New Mexico Standards and Guidelines)*.

Surface disturbance of soil, including compaction of soil or loss of vegetation cover, might increase water runoff and downstream sediment loads and lower soil productivity, which may degrade water quality, alter channel structure, and affect overall watershed health.

The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location within the watershed, soil characteristics, time and type and degree of disturbance, existing vegetation type and quantities, and climatic conditions.

Currently, there is incomplete information regarding groundwater associated within the Monument. Given the history of the Robledo Mountains, the inferred lack of aquifer potential, and the absence of groundwater data within the Monument, there is still a high degree of uncertainty regarding groundwater resources. Therefore, impacts to groundwater from management actions cannot be analyzed in detail. Additionally, the absence of perennial and intermittent surface waters in the Monument also limits the ability to analyze impacts to surface water resources from management actions. The analysis below focuses on impacts to the Rio Grande from management actions produced within the Rio Grande watershed.

Management Decisions with No Impacts to Water Resources: The following resources or uses have little or no impact on water resources for all alternatives: Air Resources, Special Status Species, Visual Resources, and Wildlife.

Effects Common to All Alternatives: Impacts to the Rio Grande could occur if nonpoint source pollutants (NPS) are produced from surface disturbing activities and transported to the River. Surface disturbing activities often result in decreased infiltration, increased runoff and erosion, degradation of vegetation, alteration of soil characteristics, changes in water flow patterns, and decreased watershed health. This could cause elevated concentrations of NPS to be transported to the Rio Grande. The degree of impact attributed to any one disturbance or series of disturbances under Alternatives A, C, and D could be highly variable and would be influenced by several factors, including location within the watershed, soil characteristics, time and type and degree of disturbance, existing vegetation type and quantities, and climatic conditions. Each one of these variables would be accounted for when developing mitigation measures for all surface disturbing activities occurring in the Rio Grande watershed. The greatest anticipated impacts on water resources would occur from surface disturbance associated with paleontological resources, trails and travel management, livestock grazing, and recreation and visitor services.

All resource management actions that propose limitations or restrictions on surface disturbing activities would help soil stability and productivity and aid vegetation communities necessary to slow water velocities and hinder erosion. Therefore, the proposed actions under Alternative B would have the greatest capabilities for reducing surface disturbance, resource degradation, and NPS pollutants.

4.4.17 WILDLAND FIRE MANAGEMENT

Assumptions and Incomplete Information: There is no known wildland fire event within the area of the Robledo Mountains. The occurrence of a wildland fire in the Monument would be uncommon. Predicting future wildland fire occurrence is highly speculative. Many factors influence wildland fires such as fuel source availability, ignition sources (human and natural caused), and weather conditions.

Protecting cultural and paleontological resources from prescribed fire would require small site-specific fuels modifications where necessary to reduce the imminent threat of fire. This could include removing vegetation down to mineral soil around known cultural sites for planned fire events.

Management Decisions with No Impacts to Wildland Fire Management: The following resources or uses have no or little impact on Wildland Fire Management: Paleontological Resources, Education and Interpretation, Air Resources, Lands and Realty, Lands with Wilderness Characteristics, Socio-Economic Conditions, Soils, Special Status Species, Visual Resources, Water Resources, and Wildlife.

Effects Common to All Alternatives:

Impacts from Special Designations-Area of Critical Environmental Concern – In the ACEC, natural ignited fires would only be allowed to continue to burn in areas designated as Fire Management Unit Categories C and D. The ACEC within the Monument is Fire Management Unit Category C.

Impacts from Vegetation – Vegetation restoration, through herbicide application could result in recovery of, and increase in herbaceous vegetation and grasses within the Monument. This increase in fine fuels could also increase potential for naturally ignited and man-caused fires.

IMPACTS OF THE ALTERNATIVES

4.4.17.1 ALTERNATIVE A

Impacts from Recreation and Visitor Services – Visitor facilities would be practically non-existent. Dispersed camping along with campfires would be allowed. Recreation activities could increase the potential for human-caused wildfire events. Dispersed camping in areas where designated campfires rings have not been created would be allowed, however; lack of a fuel reduction strategy in these areas represents a high risk for human-caused fire ignitions.

Impacts from Trails and Travel Management – The existing routes would continue to be used for motorized, mechanized, and pedestrian travel. Recreation activities could increase the potential for man-caused wildfire events through OHV use. Motorized vehicle use on existing trails could increase potential for human-caused fires, due to mechanical instances such as overheating.

Impacts from Livestock Grazing – Livestock would continue to graze public land forage. The understory that could carry fire would be eaten, reducing the possibility of a wildfire.

4.4.17.2 ALTERNATIVE B

Impacts from Recreation and Visitor Services – Under Alternative B, the Monument is closed to SRPs, camping and campfires. Closure of the Monument to all permitted recreational events and campfires would reduce the potential for human caused fire. Recreation activities such as hunting and

recreational target shooting would continue and could increase the potential for man-caused wildfire events.

Impacts from Trails and Travel Management – Under Alternative B, the Monument is closed to motorized or mechanized recreation. Closure of the Monument to all motorized and mechanized vehicles would reduce the potential for human caused fire.

Impacts from Livestock Grazing – Livestock grazing would not be permitted within the Monument. Elimination of livestock grazing activities would increase the amount of herbaceous plant materials. Fuel continuities would increase as herbaceous plant material increases. Potential for wildfire, both naturally ignited and human caused would be greatest and potentially larger in size under this Alternative.

4.4.17.3 ALTERNATIVE C

Impacts from Recreation and Visitor Services – Visitor facilities such as toilets, shade shelters, information kiosks, trail markers, and picnic sites would be developed and maintained. Campfires would be limited to designated campfire rings. Visitor use would likely increase as facilities, are developed, which could result in increased fire ignitions. Designated campfire rings would reduce the chance of human-caused fire ignitions as compared to Alternative A. Recreational target shooting would not be allowed, therefore decreasing the chance of a human-caused wildfire from this recreational activity.

Impacts from Trails and Travel Management – Under Alternative C, visitor facilities such as new routes and trails would have the potential to be developed and maintained. Visitor use would likely increase as routes and trails are developed, which could result in increased fire ignitions.

Impacts from Livestock Grazing – Grazing would continue except where excluded to protect paleontological resources, campsites, or other specified locations. Impacts to wildland fire management from livestock grazing under Alternative C would be similar to those described under Alternative A; except that grazing could be eliminated from camping areas with fire rings. This could increase the fire behavior of human-caused fires in that immediate area. Increased fuel loading around campfires could increase the potential for human-caused fires.

4.4.17.4 ALTERNATIVE D

Impacts from Recreation and Visitor Services – Impacts to wildland fire management from recreation and visitor services under Alternative D would be the same as those described under Alternative C.

Impacts from Trails and Travel Management – Impacts to wildland fire management from Trails and Travel Management under Alternative D would be the same as those described under Alternative C.

Impacts from Livestock Grazing – Impacts to wildland fire management from livestock grazing under Alternative D would be similar to those described under Alternative A except prescribed fire is a management alternative under Alternative D.

If fire is used as a management tool, existing uses such as livestock grazing would have to be considered. Designated burn areas may need to be rested from grazing pressure to allow for grass densities to become favorable to carry fire and meet resource objectives. Proper grazing practices through the removal of herbaceous material usually favor less intense wildfire and wildfire potential.

4.4.18 WILDLIFE

Management Decisions with No Impacts to Wildlife: Under all Alternatives, the following resources and uses have no or little impact on Wildlife: Air Resources, Cultural Resources, Lands with Wilderness Characteristics, Socio-Economic Conditions, Soils, Special Designations, Visual Resources, and Water Resources.

Effects Common to All Alternatives:

Impacts from Vegetation – Any vegetation treatment would benefit wildlife by increasing forage and improving grassland habitat.

IMPACTS OF THE ALTERNATIVES

4.4.18.1 ALTERNATIVE A

Impacts from Paleontological Resources – Casual collecting of common invertebrates and plant paleontological resources and scientific research would continue, which would continue to affect wildlife. Continuation of these activities would temporarily displace wildlife in areas that are being used; however, this would be of short duration and would not cause wildlife species to permanently vacate the area.

Impacts from Recreation and Visitor Services – Under Alternative A, visitor facilities would be practically non-existent and dispersed camping along with campfires would be allowed. Wildlife would continue to be affected by casual recreational use of the Monument. Continuation of these activities would temporarily displace wildlife in areas that are being used; however, this would be of short duration and would not cause wildlife species to permanently vacate the area.

Impacts from Trails and Travel Management – Under Alternative A, approximately 32.2 miles of motorized and mechanized vehicle use routes and 5.3 miles of trails for mechanized vehicles only are designated for use. Use of motorized and mechanized vehicles could potentially cause injury or mortality of slow moving wildlife such as reptiles that may inhabit areas near roads.

Impacts from Livestock Grazing – Under Alternative A, livestock grazing and range improvements would continue. Grazing activities such as water facilities would benefit wildlife due to continued availability of water in an area in which water would not naturally occur. Any preexisting fences that do not follow BLM wildlife friendly fence specifications would pose a risk to wildlife through entanglement. If existing fences are to be replaced or rebuilt, they would be required to be built to BLM specifications using proper wire spacing and to mitigate and prevent entanglement by wildlife. Any new fences constructed within the monument would be required to follow the same specifications. There are no large migrating wildlife populations that would be impeded by fences on the Monument.

Providing water can change the composition, sizes, and abundance of wildlife populations. While some species will benefit from the increased availability of water, other species that are not dependent on water availability may see little or no benefit. Research shows that animals such as desert bighorn sheep and pronghorn are not dependent on water being present but will use it if available. Studies found that pronghorn do not rely on wildlife waters whenever the moisture content in plants found in their diet is high, but will heavily rely on wildlife waters when the moisture content is low (Beale *et al.* 1970). Throughout the Desert Southwest, prolonged dry periods with little or no precipitation exist not only outside of the monsoon season, but can occur over several years. In these desert environments, free-standing water is an important habitat component for ungulates (Bleich *et al.* 2006) and other species of

wildlife such as migratory birds. This is especially apparent through the dry spells that often occur. The closest perennial water source is the Rio Grande, but in dry years, the river has become intermittent depending on the amount of water released from upstream dams for irrigation use. There are no naturally occurring springs within the Robledo Mountains. In order for wildlife to access the nearest natural water sources, they would have to cross busy roadways and populated areas.

As stated by Joan Scott (1997), to claim a wildlife benefit, a livestock water must be designed and managed to provide wildlife values. Currently, livestock waters on the Monument are fitted with wildlife escape ramps and are left on year-round to provide an additional source of water for wildlife use.

Impacts from Wildland Fire Management – Under Alternative A, there would be no management actions for Wildland Fire Management that would impact the Wildlife Program.

4.4.18.2 ALTERNATIVE B

Impacts from Paleontological Resources – Casual collecting of common invertebrates and plant paleontological resources would not be allowed, but scientific research would be allowed. Scientific research could be minimally invasive to wildlife, but research could temporarily displace wildlife.

Impacts from Recreation and Visitor Services – Under Alternative B, recreational use would be limited to hunting, hiking, equestrian use, and sightseeing. Aside from the animals being hunted, this use would be minimally disturbing to wildlife in general. No camping would be allowed; therefore, displacement would be limited to day-use associated with dispersed recreation. This temporarily displaces wildlife in areas where the recreation is occurring.

Impacts from Trails and Travel Management – Under Alternative B, motorized and mechanized vehicular use of the Monument would be prohibited thus minimizing the chance of injuries to slow moving wildlife on or near travel routes.

Impacts from Livestock Grazing – Under Alternative B, livestock grazing would not be allowed within the Monument. Prohibiting grazing and its associated activities would both benefit and stress wildlife. Availability of forage and cover would increase as grasses and forbs would be expected to increase in certain areas. This would be beneficial to wildlife. Throughout the Monument, biodiversity is low and populations are not large; as would be expected for a shrub invaded Chihuahuan Desert ecosystem (Baez 2008). Wildlife that inhabit the Monument has become accustomed to utilizing artificial water sources and the removal of these sources would cause wildlife to leave the Monument and find water sources elsewhere. Should pipelines and troughs be retained for use by wildlife, modifications to the facilities may be needed, or a new water source would need to be found to supply water to these facilities, as the existing source is a well on private land not under the jurisdiction or control of the BLM.

Impacts from Wildland Fire Management – Under Alternative B, there would be no management actions for Wildland Fire Management that would impact the Wildlife Program.

4.4.18.3 ALTERNATIVE C

Impacts from Paleontological Resources – The impacts of Alternative C would be the same as described in Alternative B.

Impacts from Education and Interpretation – Under Alternative C, pedestrian trails and interpretation kiosks that are developed would potentially bring an increase in human traffic causing wildlife to temporarily vacate the area near the trails and kiosks.

Impacts from Recreation and Visitor Services – Under Alternative C, visitor facilities such as toilets, shade shelters, information kiosks, trail markers, and picnic sites would be developed and maintained. This could displace wildlife where these facilities would be built and used. Dispersed recreation would continue to temporarily displace wildlife in areas where the recreation is occurring. The establishment of a primitive campground would displace any wildlife that inhabits the area where the campground would be built. An increase in human activity would cause wildlife to vacate areas frequented by humans.

Impacts from Trails and Travel Management – Under Alternative C, vehicular use of the Monument would continue on a portion of the existing routes, and new routes could be developed; therefore, there would be potential for slow moving wildlife to be injured on and near travel routes. This risk would increase during special events where a greater number of vehicles would be utilizing the routes.

Impacts from Livestock Grazing – Impacts to the Wildlife Program from livestock grazing under Alternative C would be the same as those described under Alternative A.

Impacts from Wildland Fire Management – Under Alternative C, there would be no management actions for Wildland Fire Management that would impact the Wildlife Program.

4.4.18.4 ALTERNATIVE D

Impacts from Paleontological Resources – Under Alternative D, casual collecting of common invertebrates and plant paleontological resources would be allowed in conjunction with prior BLM authorized interpretive or educational programs or activities. This would direct fossil collectors to specific locations, which would potentially increase wildlife and human interaction. This may cause certain wildlife to vacate the collection areas.

Impacts from Education and Interpretation – Under Alternative D, pedestrian trails, interpretation kiosks, and a motorized tour route that could be developed would potentially bring an increase in human traffic causing wildlife to temporarily vacate the area near the routes, trails, and kiosks to avoid confrontation. The establishment of an on-site visitor center would displace wildlife from the site chosen for the visitor center. Activities associated with the construction of the visitor center could potentially lead to mortality of slow moving wildlife unable to quickly vacate the area.

Impacts from Recreation and Visitor Services – Under Alternative D, impacts to the Wildlife Program would be similar to those described under Alternative C.

Impacts from Trails and Travel Management – Impacts to the Wildlife Program from Trails and Travel Management under Alternative D would be the same as those described under Alternative C.

Impacts from Livestock Grazing – Impacts to the Wildlife Program from livestock grazing under Alternative D would be the same as those described under Alternative A.

Impacts from Wildland Fire Management – Under Alternative D, prescribed fire is allowed as a management tool. Prescribed fire could displace, kill, and render habitat unsuitable for wildlife for longer durations of time than a one-time event, road construction, or some other short duration disturbing activity. The long-term positive benefits of prescribed fire to the overall ecosystem would be substantial.

4.5 CUMULATIVE IMPACTS

The Council on Environmental Quality regulations state that the cumulative impact analysis should include the anticipated impacts on the environment resulting from “*the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time*” (40 CFR 1508.7).

Impacts of the Alternatives presented in this RMP/EIS are assessed for cumulative impacts along with other actions conducted in the *Analysis Area*.

4.5.1 Methodology

The cumulative impacts discussion that follows considers the Alternatives in the context of the broader human environment and, specifically, actions that occur outside the scope and geographic area covered by the Planning Area. Because of the programmatic, comprehensive nature of the RMP, this assessment is broad and generalized to address potential effects that could occur from the Alternative management actions when combined with other activities or projects. This assessment is primarily qualitative for many resources because of the lack of detailed information that would result from project-level decisions and other activities or projects.

Cumulative impact analysis is limited to important issues of national, regional, or local significance. Therefore, not all issues identified for direct or indirect impact assessment in this EIS are analyzed for cumulative effects. The spatial boundaries of each resource’s cumulative analysis, known as the cumulative impact analysis area, vary by resource and are larger for resources that are mobile or migrate (i.e., air quality or wildlife species) compared to resources that are stationary (i.e., paleontological resources). The spatial boundaries of resources and resource uses may be contained within the *Planning Area* or may extend beyond the *Planning Area*. Evaluation of potential impacts considers incremental impacts that may result from the proposed project, while also considering impacts from past, present, and reasonably foreseeable future actions. Reasonably foreseeable future actions are those future actions that have been committed to or that are known proposals that could take place within the planning period. These are not actual planning decisions or resource commitments.

The BLM land surrounding the PTNM is undergoing an RMP revision. This RMP is not approved nor funded, so it will not be included in cumulative impacts. Reasonable Foreseeable Future Actions must be approved or funded to be considered.

Chapter 3 *Affected Environment* considers the impacts of past and present actions on the current conditions within the Monument. Past events/actions and reasonably foreseeable actions that have or are occurring in the *Analysis Area* are documented in the following table:

Table 4-6 Reasonably Foreseeable Future Actions in Doña Ana County

REASONABLY FORESEEABLE FUTURE ACTIONS IN DOÑA ANA COUNTY (2010 TO 2030)						
PROJECTED POPULATION GROWTH	The population of Doña Ana County is anticipated to increase through the life of the Plan. Below are population projections for the <i>Analysis Area</i> .					
	POPULATION PROJECTIONS BY YEAR					
	COUNTY	2010	2015	2020	2035	2030
	Doña Ana	227,009	253,548	282,152	313,073	345,458
	SOURCE: Bureau of Business and Economic Research, University of New Mexico 2004					
VISION 2040 REGIONAL PLANNING PROJECT	The <i>Vision 2040</i> Comprehensive Regional Plan is the first long-range regional plan to include Doña Ana County and its four municipalities: the City of Las Cruces, Village of Hatch, Town of Mesilla, and City of Sunland Park. The study addresses a wide range of growth-related issues, such as transportation, utilities and water, economic development, affordable housing, environmental protection, hazard mitigation, and intergovernmental cooperation. It includes extensive analysis of the current situation and a range of possible growth scenarios. Recommendations from Vision 2040 will be used for updates to the City of Las Cruces and Doña Ana County comprehensive plans.					
NEW MEXICO RIO GRANDE TRAIL	New Mexico State Parks is in the process of establishing a trail which would roughly parallel the Rio Grande. The basic infrastructure of the trail already exists in many locations via the levee systems and informal trail networks of the irrigation districts and on some publicly-owned land. The river and its bosque attract and sustain a wide variety of recreation -- from hunting and fishing to river rafting to hiking, biking, and horseback riding. The trail will ultimately link all these sites and tie into the new Mesilla Valley Bosque State Park near Las Cruces. Communities in southern New Mexico, such as in Doña Ana County, have been actively pushing trail planning and development locally.					
STATE GRAVEL PIT	Approximately 240 acres of New Mexico State trust land are leased to a sand and gravel operator that is directly adjacent to the southeast of the Monument. It is located in T. 22 S., R. 1 E., Section 32. The current operation has been permitted with the State of New Mexico since 2000.					
BLM COMMUNITY PIT NO. 1	In 2008, an Environmental Assessment (NM-030-2009-0042) was completed by the BLM Las Cruces District Office for the purpose of improving public safety; reducing visual impacts; returning the Community Pit to multiple-use; and reducing erosion and other resource impacts. The proposed action is for the BLM to design and reclaim Community Pit No.1. The exposed fossil bearing strata around the quarry body would be mapped and recorded as a component of the reclamation design.					
DOÑA ANA COUNTY BLM RECREATION AREAS	Within Doña Ana County, the BLM has several recreation areas: Picacho Peak, Doña Ana Mountains, A-Mountain, Organ-Franklin Mountains, Dripping Springs, Aguirre Spring, and Aden Hills OHV area. Some areas have dispersed recreation while others have maintained trails. Hiking, picnicking, and sightseeing are offered at all of the sites. Doña Ana Mountains are best known for their mountain bike trails. Aden Hill OHV Area is used by motorcycles, and Aguirre Spring offers a campground. Picacho Peak and Dripping Springs offer picnic areas, trails, and beautiful views.					
NM STATE PARKS AND MONUMENTS	New Mexico State Parks manages three areas within Doña Ana County: Mesilla Valley Bosque State Park; Fort Selden State Monument; and Leasburg Dam State Park. Mesilla Valley Bosque State Park is south of PTNM, encompassing 300 acres of bosque (riverside forest) along the Rio Grande and 600 acres of adjacent Chihuahuan Desert. Leasburg Dam, constructed in 1908, channels water from the Rio Grande for irrigation in the Mesilla Valley. Fort Selden State Monument has a museum and ruins at the site of a 19th century army outpost. The fort was abandoned in 1891 after decommissioning.					

4.5.2 Cumulative Impacts

Based on the table of Reasonably Foreseeable Future Actions, the primary three categories of issues impacting resources associated with the PTNM are (1) increased urban development and population size, (2) an increased demand for outdoor recreational facilities such as trails, and (3) the closure of two gravel quarries. The assessment area for Cumulative Effects is Doña Ana County.

4.5.2.1 Cumulative Impacts - Paleontological Resources

Alternative A: As the population of the County increases, as well as the demand for OHV routes, an increased use of rock crawling within the Monument may lead to further damage to fossils and seriously degrade the amount and quality of research conducted in the Monument.

All Alternatives: Increases in population and other recreational facilities will bring more people into contact with the Monument and its fossil resources.

The reclamation of Community Pit No. 1 may eliminate an important fossil site for science and research that would benefit research conducted in the Monument itself.

4.5.2.2 Cumulative Impacts - Education and Interpretation

Alternatives A & B: Increases in population and nearby recreational facilities will bring more people into contact with the Monument and its fossil resources; however, a lack of facilities and programs on-site may not meet the demand or need for interpretation and education and may stress partners such as the City of Las Cruces Museum of Nature and Science.

Alternatives C & D: The BLM would be better equipped to handle an increased demand for interpretation and education and the PTNM would perhaps become an important tourist destination.

All Alternatives: Reclamation and closure of the Apache Canyon quarry and Community Pit No. 1 would eliminate an important opportunity for showcasing the fossil resources of the Robledo Mountains and would increase the amount of interpretation within the boundary of the Monument.

4.5.2.3 Cumulative Impacts - Recreation and Visitor Services and Trails and Travel Management

Alternative A: The increased local and regional population may lead to an increase of extreme OHV rock crawling events.

Alternative B: By closing the Monument to OHV recreation and Special Recreation Permits, these activities would shift to other public land areas that would not offer the same types of challenges, and the BLM would not be meeting an important regional recreational demand.

Alternatives C & D: Continued use of most of the Monument for OHV recreation would meet the regional demand for rock crawling activities.

4.5.2.4 Cumulative Impacts - Climate

Emission of GHGs is a cumulative issue with potential long-term effects. Although emission of GHGs from activities in the *Analysis Area* would contribute to the total greenhouse gases in the global pool, the models used by climate scientists are not precise enough to: (1) predict impacts on climate or the natural

environment from increased or decreased emissions occurring from a specific region, or (2) determine the effects in a localized area. It is probable that these impacts would not be from the BLM activities proposed within the Monument.

Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability of climatic conditions, but increasing concentrations of greenhouse gases (GHGs) are likely to accelerate the rate of climate change.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) predicted that by the end of the 21st Century, global average surface temperatures would increase 1.1 to 6.4°C (2.0 to 11.5°F) above 1980-1999 levels under a range of potential emissions scenarios (IPCC 2007b). The US Global Change Research Program, in its 2009 Report on *Global Change Impacts in the United States* explains that actual warming levels within this range depend on the future level of emissions and the sensitivity of climate systems to those emissions. The National Academy of Sciences (2006) points out that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes and in the middle of continents. The US Global Change Research Program Report indicates the most of the US will experience greater warming in summer than winter although Alaska will experience more warming in winter. It is not, however, possible to predict with any certainty regional or site-specific effects on climate relative to the proposed action.

Potential impacts to natural resources and plant and animal species due to climate change are likely to be varied, including those in the southwestern United States. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils and decreased vegetative cover. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened or endangered plants may be accelerated. Due to loss of habitat or competition from other species whose ranges may shift northward, the population of some animal species may be reduced or increased. Less snow at higher elevations would likely impact the timing and quantity of snowmelt, which, in turn, could impact water resources and species dependent on historic water conditions. When compared to baseline information for 1961-1990, periods between 1991 and 2005 show temperature increases in over 95 percent of the geographical area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts of the state (Enquist and Gori 2008).

The assessment of GHG emissions, their relationship to global climatic patterns, and the resulting impacts is an ongoing scientific process. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models capable of predicting climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. Determining the significance of any discrete amount of GHG emissions is beyond the limits of existing science. However, scientists are increasingly able to isolate likely scenarios for climate change and its impacts on a regional scale. The U.S. Global Change Research Program Report on *Impacts of Climate Change in the United States* (2009) focuses on broad areas of the country and greatest points of vulnerability as well as looking at Climate Change Impacts in different sectors of the economy. In the Southwest, a particular concern is the uncertainty around precipitation and the potential for extended periods of drought stressing already uncertain water supplies.

4.5.2.5 Cumulative Impacts - Air Resources

Alternative A: In Alternative A, roads within the Monument that would access visitor facilities would not be improved. Increased visitation to the area would contribute to regional dust concentration levels.

Alternatives B, C and D: Improved road conditions (in Alternatives C and D) and an OHV permit system, or closed routes (Alternative B) would mitigate levels of dust generated in the Monument despite the growing level of public use of the Monument. Airborne dust particles would probably increase in the County, caused by development and construction, but dust associated with the Monument would be a minor component.

4.5.2.6 Cumulative Impacts - Lands and Realty

All Alternatives: It is anticipated that approximately 640 acres of mineral estate could be acquired and transferred into public ownership over the life of this Plan in all Action Alternatives. Cumulative impacts from this acquisition, the withdrawal of the Federal minerals within the Monument and any other acquisitions or withdrawals within Doña Ana County would minimally decrease the mineral land development opportunities.

All Alternatives: Legislation directs the exclusion of land use authorizations that do not benefit the Monument. Project proponents would be required to seek alternate routes or sites outside the Monument. This would be a minor cumulative effect by reducing routing options through the Monument and possibly increasing construction costs for utilities. This would not impact the number of land use authorizations, it would only affect the permitted location, and would possibly increase construction costs.

4.5.2.7 Cumulative Impacts - Lands with Wilderness Characteristics

All Alternatives: Mineral activities and motorized recreational use adjacent to the Monument could impact the outstanding opportunities for solitude and primitive unconfined recreation in the areas found to have wilderness characteristics. In the *Analysis Area*, as population growth continues, conflicting uses or activities are likely to diminish wilderness characteristics in areas that are not being protected for their wilderness characteristics. In Alternatives A, C, and D, those areas not being protected for their wilderness characteristics may potentially be affected by cumulative impacts from such activities as recreational use, development of visitor facilities, interpretation and education development, and scientific research.

4.5.2.8 Cumulative Impacts - Livestock Grazing

Alternatives A, C and D: There are 62 grazing allotments within Doña Ana County. Continued expansion of the City of Las Cruces and other towns, and development of private land in Doña Ana County, has resulted in an urban interface that impacts these allotments. Increased recreational use on public land has resulted in damage to allotment pipelines and fences used in managing cattle. Future population growth would potentially result in continued conflicts with livestock grazing in the Monument.

4.5.2.9 Cumulative Impacts - Socio-Economic Conditions

The assessment area for socio-economic conditions is Doña Ana County.

Since 1990, the population in the *Analysis Area* has increased substantially. Continued population growth is expected. This growth would increase the demand for recreational opportunities in the area. As a

result, recreational use of the Monument would increase. Conflicting values related to public land uses (e.g., motorized recreation and preservation of wilderness characteristics) require managers to make tradeoffs, which may reduce some individuals' quality of life. Population growth would make these pressures more acute.

Increased urbanization would affect the viability of public land grazing. As addressed in Cumulative Impacts to Livestock Grazing, constraints on grazing would affect the economic well-being of permittees.

In Alternative B, motorized vehicle use and SRPs are not allowed within the Monument, which would either push the use outside of the Monument or outside of Doña Ana County. If the use leaves Doña Ana County, the economic stimulus from this use would be lost.

4.5.2.10 Cumulative Impacts - Water Resources, Vegetation, and Soils

All Alternatives: Surface disturbance and loss of vegetation are key contributors to decreased water infiltration, increased soil erosion, and degradation to watershed health. Population growth around Las Cruces could have direct and indirect negative impacts on water resources and watershed health resulting from increases of paved roads, parking lots, buildings, and other impermeable surfaces due to the expansion of residential, commercial, and industrial development. It is inferred that recreational activities, such as camping and OHV use, outside city limits would increase proportionally to population growth. Negative impacts would primarily be derived from surface disturbance such as new roads and trails, in which the magnitude of the impacts would be dependent on the type, intensity and duration of the disturbance. Alternative B has the most potential for positive impacts to water resources and watershed health within the Monument, due to the prohibition of motorized and mechanized vehicle use and livestock grazing. Limiting these two uses could result in decreased surface disturbance and soil erosion within the Monument. However, these impacts would likely be transferred to land outside of the Monument.

4.5.2.12 Cumulative Impacts - Wildlife and Special Status Species

All Alternatives: Wildlife and special status species in the Monument may be affected by offsite use and development regardless of the RMP alternative selected. Development of lands within the County would reduce habitat availability and may reduce special status species populations. The habitat values of the Monument would become more important as similar habitats in the County were utilized for urban and agricultural development.

4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

A discussion of irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented is required by Section 102 (2) (C) of NEPA. Irreversible commitment of a resource is a resource commitment that cannot be reversed such as an extinction of a species or destruction of a paleontological resource. An irretrievable commitment of a resource is one that is lost for an amount of time such as a mineral withdrawal.

By allowing collecting of invertebrate paleontological resources this could result in an irreversible commitment of resources. Although this collecting has to result in only negligible disturbance to the Earth's surface or other resources, it could result in loss of vertebrate paleontological resources also. By allowing scientific collecting of significant paleontological resources, this will mitigate the possibility of an irretrievable loss to these resources. Those fossils will be curated in a Federal repository, studied, and

possibly displayed for the public to view. Development of interpretation, educational, and recreational resources and approving land use authorizations and research permits that result in surface disturbance would create irreversible or irretrievable results for soil and vegetation. In order to reduce these impacts, best management practices would be used. During all surface disturbing activities, the laws protecting cultural and paleontological resources would be adhered to in order to reduce or eliminate impacts on these resources. The withdrawal of the Monument from mineral development would preclude the extraction and use of these resources. It is possible, but unlikely the withdrawal would be removed by Congress and therefore this action is considered an irretrievable commitment of resources.

4.7 UNAVOIDABLE ADVERSE IMPACTS

Section 102 (2) (C) of NEPA also requires that any adverse environmental effects which cannot be avoided should this proposal be implemented are disclosed. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures.

Casual collecting of common invertebrates in Alternative D would cause unavoidable loss, but the educational gain from this activity would outweigh the loss. Unavoidable loss for other paleontological resources could occur due to looting, vandalism, erosion, and inadvertent destruction. This impact is expected to be reduced as surveys of the Monument are completed and necessary precautions are put in place. Unavoidable adverse impacts from increased visitation are increased soil compaction and erosion, disturbance to vegetation, wildlife, and livestock, wildfire ignition, and conflicts between users. Vehicle use within the Monument could inadvertently destroy cultural or paleontological resources if the resource was not detected and protected. Travel management restrictions such as route closures have an adverse impact on recreational motorized or mechanized use within the Monument. Should livestock grazing be eliminated within the Monument as proposed in Alternative B, it would have an adverse impact on the livestock grazing permittee.